Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Telephone Weekly, Telephone Magazine, Telephone Securities, The Telephone and Sound Waves
PUBLISHED WEEKLY BY THE TELEPHONY PUBLISHING COMPANY, MONADNOCK BLOCK, CHICAGO

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BUYERS REFERENCE INDEX PAGE 65

CHICAGO, MAY 24, 1913

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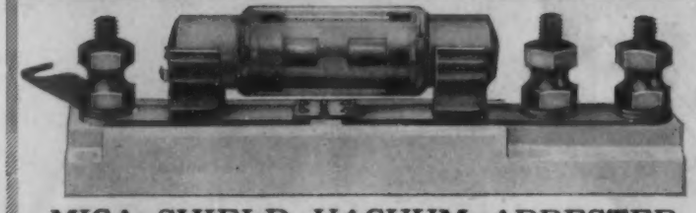
IMPROVE THE SERVICE WITH BRACH SPECIALTIES



MICA SHIELD VACUUM ARRESTER

These features are worthy of your consideration. 1—Highly sensitive to every form of static current and inductive charges. 2—Absolute safety against possible grounding. 3—Insulation between line and ground always constant. These are only a few of the many advantages of the Mica Shield Vacuum Arrester. For complete description and prices write us.

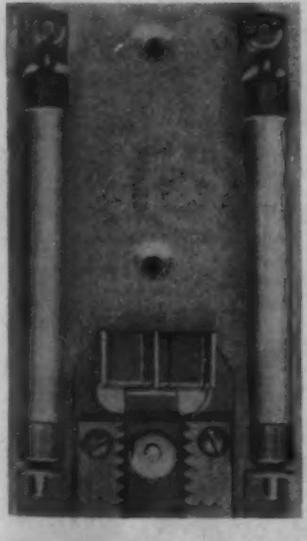
Our Arresters

are endorsed by a majority of leading Engineers on Telegraph, Telephone and Railroad Companies, including Fire and Police Departments.

A PURE METAL SOLDER IN COLLAPSIBLE TUBES

Ready for instant use. No fluxing or acid needed. Simple, economical, permanent. Absolutely non-corrosive. A tube goes a long way.

Price 25c, At All Dealers



ANTI-GROUNDING AND NON-DUSTING LIGHTNING ARRESTERS

will pay for themselves in one season. Give them a trial in your worst places and you will want them everywhere. The high resistance material used is made under great electrical heat and is of such a nature that static discharges passing through it have absolutely no effect. Will not break down under 1000 volts.

BRACH HYDRO-GROUND

Water is essential to a good ground.

The bowl shaped arrangement—an exclusive feature of the HYDRO-GROUND—is provided to catch water and retain it. The Hydro-Ground has the largest area of exposed surface for a given size hole and is the most easily installed.

In addition it does away with the necessity for soldering connections by providing a special form of connector.

With all its advantages Brach Hydro-Ground is very reasonable in price. What more could be desired?

L. S. BRACH SUPPLY COMPANY

Main Office, 143 Liberty Street, New York — Karpen Building, Chicago Ill.

THE SELECTION OF McCLOUD OPERATOR CHAIRS

affects your whole exchange. They materially increase the comfort of the operator whose nervous strain is reduced and your subscribers receive better and more courteous service. It is safe to say:—McCloud Operator Chairs are back of your service. Go into the matter further, at least write for our catalog and prices.

The Davis Chair Co.

MARYSVILLE, OHIO

The most efficient telephone cell

1900 BATTERY

Ask your jobber—he handles them

NUNGESSER CARBON & BATTERY CO.
CLEVELAND, OHIO

"CHICAGO GRIP"

For Insulated Wire

These grips will not slip and do no injury to insulation. Made of steel throughout.

Their size, shape and weight allow of rapid, easy handling. Hold themselves in place when placed on wire.

Can be pushed out on wire to get necessary slack—and pull straight, leaving no kinks in the wire.

If it's a **Klein Tool**—you know it's **right.** These grips listed in the Klein catalog—**write for it.** It also shows Chicago grips for bare wire for all diameters up to 4/0.

Mathias Klein & Sons Co.
Station U 34 Chicago, Ill.

B&K

B & K Guy Clamp

The clamp that holds beyond the breaking point of the rope.
Made in one piece of drawn steel—practically indestructible.
A powerful T head bolt holds the wire solidly against grooved recess of the clamp.
The case portion is made from drawn steel and retains its shape even when the breaking point of the rope is reached.
You want to know more about the B. & K. guy clamp. It means economy—efficient construction.

The B & K Catalog—Yours for the asking

Barnes & Kobert Mfg. Co.
New Haven, Conn.

C. O. BAKER, President C. W. BAKER, Vice-Pres.

PLATINUM

Foil, Sheets, Wire, Rivets and Contacts

Anything Made According to Specifications

SCRAPS PURCHASED

SEND FOR LITERATURE

Baker & Company, Inc.

New York, N. Y. 30 Church Street

Newark, N. J. 408 N.J.R.R. Ave.

To meet adequately the most severe operating conditions

Belden Telephone Cords

are specially made. We make a cord or wire for every particular purpose—for each industry requiring individual wire or cords. Our operating facilities enable us to turn out a superior product at a very low price. It will pay you to investigate—*free samples sent on request.*

BELDEN MFG. CO.

2302 South Western Avenue, CHICAGO

Runzel-Lenz

Electric Manufacturing Company
1751-1753 N. Western Ave.
Chicago, Ill.

The arteries of the telephone system through which throbs the life-blood of the telephone industry, the channels which direct the voice of millions with unfailing accuracy, important factors of a wonderful system—indispensable to efficient service.

Runzel-Lenz Cords

Samples free upon request. You owe it to your service to try them.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

"American" Apparatus Always Makes Good

Whatever the size of your plant, your own best buy is

"AMERICAN"

Don't take our word for it—try the goods.

Wherever you have been buying, for your own good, write to that nearest depot.

No. 43 Desk Stand

Whatever your service conditions you can better by using

"AMERICAN"

Make us prove it. We like to do so.

Wherever you are, there is a nearby stock for you. See list below.

No. 43 Desk Set

The induction coil in base saves maintenance four ways—one less conductor in the cordage—lower center of gravity prevents toppling stands—safely hidden prevents meddling and damage—easier tested and repaired.

If this phone costs no more than other kinds and you can save 20 per cent, which will you buy?

Magneto or C. E.

The solid head prevents loose connections and broken cords—one screw holds base and stem together—no wires between base and stem—stiff rod contact from switch to terminal springs — strong spiral compression spring supports hook—roller cam assures positive contacts—leather protection against scratched desks.

Central Electric Co., Chicago, Ill.

Varney Electric Co., Indianapolis, Ind.

Robbins Electric Co., Pittsburg, Pa.

American Electric Co., St. Joe, Mo.

Electric Supply Co., Memphis, Tenn.

Smith-Perry Electric Co., Dallas, Texas.

Write for prices to our Special Distributors or direct to us

Julius Andrae Sons Co. Milwaukee, Wis.

Herman C. Tafel, Louisville, Ky.

Robinson Nelson & Co., Richmond, Va.

N. W. Electric Equipment Co., St. Paul, Minn.

Nunn Electric Co., Amarillo, Texas.

Interstate Electric Co., New Orleans, La.

American Electric Company, Chicago, U. S. A.

State and 64th Sts. **Manufacturer complete line of Telephone Apparatus** **(Englewood Sta.)**

Please tell the Advertiser you saw his Announcement in TELEPHONY.

"Central Energy"

REGISTERED TRADE MARK

Code No. 988 Type
Induction Coil Mounted in Base

STROMBERG-CARLSON offered the only system of its kind for Independent use under its registered trade mark "Central Energy." At this time, as in the beginning, it is the most convenient and rapid system on the market—the system of the future. As pioneers we lead—as leaders we succeed. A record of more than 8,000 telephone exchange systems installed gives us experience worth much to you. Consider STROMBERG-CARLSON when in need of any telephone equipment.

The standard "Central Energy" telephone is the portable desk set. The STROMBERG-CARLSON Desk Telephone has no equal for service efficiency or durability. "Looks good and is good." For Local and Long Distance service. The exponent of high grade quality and superior workmanship.

Order By These Code Numbers

No. 988 "Central Energy" Desk Set—2 Conductor Cord
No. 986 " " " "—3 " "
No. 993 " " " "—Direct Current

A metal and wood extension bell for straight line or party line service as specified is furnished with each type desk set. It means something to say there are more than 2,000,000 STROMBERG-CARLSON Telephones in use.

What Are Your Requirements Today?

Stromberg-Carlson Telephone Mfg. Co.

Rochester, New York, U. S. A.

Chicago, Illinois San Francisco, Cal. Toronto, Canada

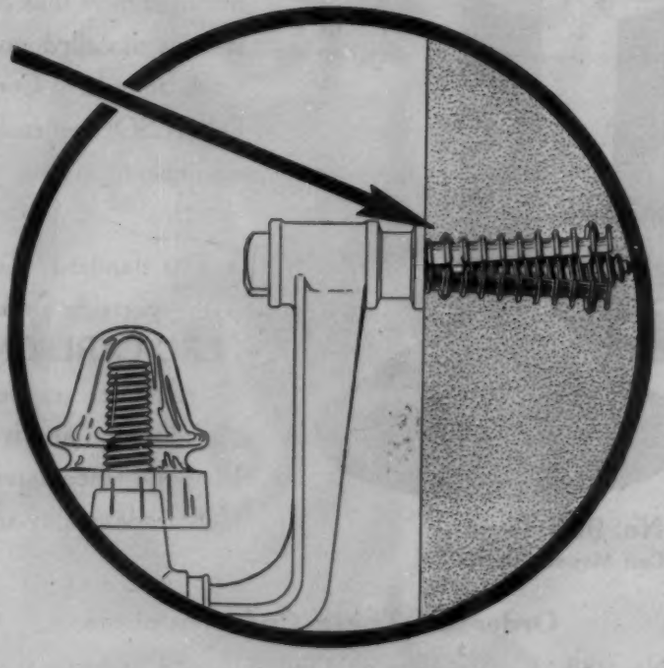
Los Angeles, Cal. Portland, Ore. Seattle, Wash.

They Never Come Down

There never was a good reason for using wooden plugs in fastening Electrical and Telephone equipment to walls, ceilings and other hard surfaces. Their use was always attended with the possibility of accidents of the "pull-out" nature, due to the rotting of the wood in course of time.

SEBCO Screw Anchors Expansion Bolts

Sebco Screw Anchors are made of a non - rusting composition metal which is sufficiently soft to allow the machine screw to cut its own thread when being tightened. They are intended for use with light equipment such as Bridle Rings, Telephone Boxes, etc.



Sebco Expansion Bolts are made of malleable iron. If the lag screw is tightened, the construction of the shield allows no give, play or movement of any kind but holds absolutely secure. They are intended for heavy equipment such as fastening Motors, Switchboards, Cable Hangers, Insulator Brackets, etc.

Using Sebco Screw Anchors and Expansion Bolts is simplicity itself. Drill a hole large enough to insert shield, attach the fixtures, tighten the screw or bolt and the shield expands, remaining in place permanently.

STAR EXPANSION BOLT COMPANY

147-149 CEDAR STREET, NEW YORK CITY

Western Electric Company

Manufacturers of the 7,000,000 "Bell" Telephones

New York	Atlanta	Chicago	Kansas City	San Francisco	Montreal	London
Boston	Savannah	Milwaukee	Oklahoma City	Oakland	Toronto	Antwerp
Philadelphia	Richmond	Cincinnati	Denver	Portland	Winnipeg	Berlin
Pittsburg	St. Louis	Indianapolis	Omaha	Seattle	Calgary	Paris
Buffalo	Dallas	Minneapolis	Salt Lake City	Vancouver	Johannesburg	Rome
Cleveland	Houston	St. Paul	Los Angeles	Edmonton	Sydney	Tokyo

EQUIPMENT FOR EVERY ELECTRICAL NEED

Press one button once!

This single, simple motion connects you with and rings up the man you want to reach

This system saves the most time because it is so simple. This system improves private intercommunicating service because it is so efficient and dependable. Your best interests will be served if you insist upon getting the latest STROMBERG-CARLSON Private Telephone System known as the

INTER-COMM-PHONE

This set consists of our No. 8-A Combination-Phone and No. 5 6-Station Key Box. No other parts, such as bell box, terminals, etc., required. Our cut shows the complete Inter-Comm-Phone set.

You simply press ONE BUTTON ONCE to get into immediate communication with the man you want to reach. And here is another new feature provided with the STROMBERG-CARLSON System. The handy Combination-Phone, which is a perfected telephone in a form that makes telephoning convenient and simpler. The most efficient and practicable equipment for the fastest and surest private telephone system. The Inter-Comm-Phone equipment includes Desk, Wall and Combination-Phones in capacities for 6—12—22 and 32 stations. Like all other STROMBERG-CARLSON Systems, the equipment is so simple and durable in construction that the initial outlay is very little and the maintenance expense insignificant.

Exchange companies can profitably push the sale of the Inter-Comm-Phone with our help. Write now if your are interested.

Have you Booklet No. 3101, Just Issued?

Stromberg-Carlson Telephone Mfg. Co.

Rochester, New York, U. S. A.

Chicago, Illinois **Toronto, Canada**

Los Angeles, Cal. **Portland, Ore.** **San Francisco, Cal.** **Seattle, Wash.**

HARPOON GUY ANCHOR

STRONGEST, STRONGEST, EASIEST TO INSTALL, NO SPECIAL TOOLS,
JUST A SLEDGE AND A MAN TO SWING IT.
HOLDS TIGHT WHEREVER ANY AND WHERE NO OTHER
PATENT ANCHOR CAN BE INSTALLED.

CATALOG FREE UPON REQUEST

CROUSE-HINDS COMPANY

SYRACUSE, N. Y., U. S. A.

NEW YORK 30 CHURCH ST. | BOSTON 201 DEVONSHIRE ST. | CINCINNATI 18 E. FOURTH AVE. | CHICAGO 417 S. DEARBORN ST.

Telephone Service Efficiency and Cost Factors

The AUTOMANUAL PROCESS has produced the following RESULTS:

POSTAL TELEGRAPH – COMMERCIAL CABLES

CLARENCE H. MACKAY, PRESIDENT

COUNTER No.
TIME FILED

TELEGRAM

CHECK

The Postal Telegraph Cable Company (Incorporated) transmits and delivers this message subject to the terms and conditions printed on the back of this blank

DESIGN PATENT No. 40,515

Send the following message, without repeating, subject to the terms and conditions printed on the back hereof, which are hereby agreed to.

Ashtabula, Ohio, May 1st 1913.

[redacted] Company,
[redacted],

Regarding economy, Automanual compared with Manual, we are serving more subscribers by thirty-one (31) per cent handling more traffic by eighty-seven (87) percent, decreased operators pay roll, thirty-nine (39) per cent, and reduced cost per thousand calls sixty-eight (68) per cent. While foregoing is based upon actual figures from our books, it is unfair to Automanual, as no credit is given account raising efficiency from sixty (60) percent to one hundred (100) percent. Are highly pleased with Automanual. Under no conditions would go back to Manual.

THE ASHTABULA TELEPHONE CO
"S.R. NEWBERRY. MANAGER.

AUTOMANUAL, as a COMPETITOR, is a "MONITOR." It is bound to send Manual and Automatic into history as did Ericsson the Wooden Navies of the World.

Every dollar invested in Operating Telephony is worth two if supported by Automanual before your competitor establishes improvements. Do not encourage your competitor by waiting.

Investigate AUTOMANUAL and EQUIPMENT TRUST CERTIFICATES.

THE TELEPHONE IMPROVEMENT CO.

MONADNOCK BLOCK
CHICAGO

AUTOMANUAL

AMERICAN TRUST BLDG.
CLEVELAND, O.

Traffic

¶ Just as an efficient city government regulates street traffic problems so the best telephone exchange system controls puzzling and difficult telephone traffic conditions.

¶ Kellogg exchange equipment is simplifying and making easier traffic problems in every state in the Union, and in many foreign installations.

¶ We continually receive voluntary examples of Kellogg efficiency and Kellogg minimum maintenance in long continued service.

You are interested in "Traffic."

You are interested in lower maintenance.

Then you are interested in Kellogg.

Let us tell you of a Kellogg installation in your vicinity.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

Efficiency

¶ Every man who sells telephone service is interested in traffic efficiency.

¶ Every man who buys telephone service is interested in traffic efficiency.

¶ The Kellogg Switchboard & Supply Company incorporate in their manual switchboard design, features distinctive to their equipment which produce traffic efficiency. These are interesting facts.

¶ Our engineers are at your service.

KELLOGG SWITCHBOARD & SUPPLY CO.

CHICAGO, ILLINOIS

KANSAS CITY, MO. SAN FRANCISCO, CAL.

CANADIAN SALES OFFICES:

REGINA, Deering Electric Co., Ltd. WINNIPEG, Houston & Co., Ltd. VANCOUVER, B. C., Holst & Co.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

Toronto

The Great Supply Center of Ontario

Geographically Ontario telephone companies are close to Buffalo, but a one-day trip on a passenger train becomes a week or weeks by freight. Then the Custom House adds to the delay. Besides that we (the factory) do not carry supplies and so ERICSSON TELEPHONES *were* difficult to secure advantageously.

No. 551
Common Battery

Now, however, we have secured as agents and distributors for the Province of Ontario

The Central Electric and School Supply Co.

34 Adelaide St. W., Toronto, Ont.

No. 450
Local Battery

They carry a *complete* stock of Steel Telephones, Handmikes, Test Sets, etc., and also every character of supply used by an exchange.

Order From Them

Ericsson Manufacturing Co.

1102 Military Road, Buffalo, N. Y.

OTHER BRANCHES AT

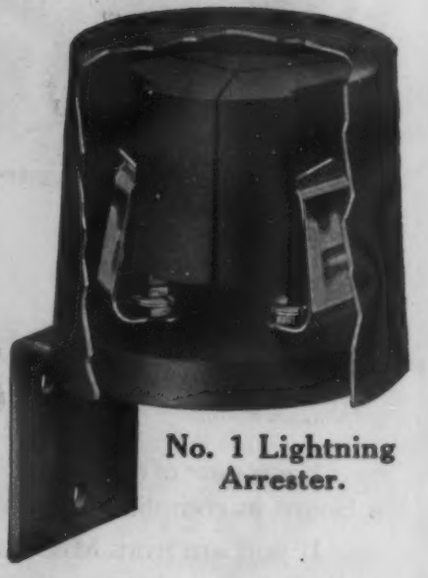
600 Preston Ave., Houston, Texas.
706 Paulsen Bldg., Spokane, Wash.
1111 Wyandotte St., Kansas City, Mo.
530 Golden Gate Ave., San Francisco, Cal.
214 So. Second St., Cedar Rapids, Iowa.
5 Governor St., Richmond, Va.
310 Terminal Place, Pittsburgh, Pa.
28 Market Ave. S.W., Grand Rapids, Mich.
73 W. Water St., Milwaukee, Wis.
810 Canal St., New Orleans, La.
329 Ankeney Ave., Portland, Ore.
22 N. 6th St., Minneapolis, Minn.
53 East Broadway, Butte, Mont.
513 W. Jackson Ave., Knoxville, Tenn.
124 St. Clair Ave. N. E., Cleveland, O.
136 So. 10th St., Lincoln, Neb.
517 W. Main St., Louisville, Ky.
1233 So. Olive St., Los Angeles, Cal.
121 So. Meridian St., Indianapolis, Ind.
453 Atlantic Ave., Boston, Mass.
620 W. Peachtree St., Atlanta, Ga.
24 W. Forsythe St., Jacksonville, Fla.

COOK

TERMINALS PROTECTORS

Cook's No 1 Lightning Arrester does not cost you much to install and it makes your subscribers think you have their interests at heart more than anything else you could do, and not only that, it protects your equipment; that is worth many times the cost of the Arrester. Built to stand a heavy discharge —can not be destroyed or affected by the elements. Prices and information on request.

Protect Your Apparatus Before It Is Too Late



No. 1 Lightning Arrester.

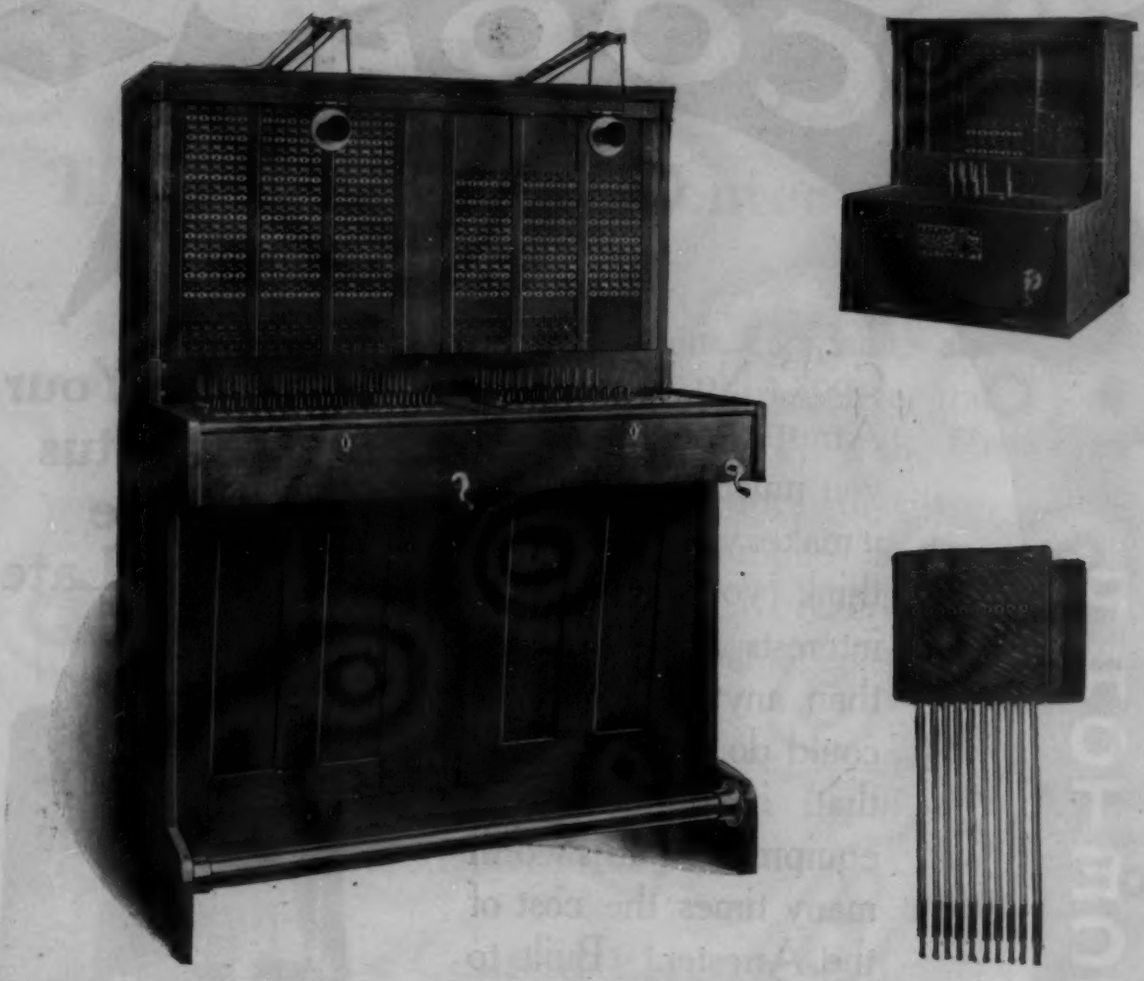
Frank B. Cook.

326 West Madison Street
Chicago

Western Representative:
Manny-Meyers Co.,
Seattle Wash.

Southwestern Representative:
Tel-Electric Co.
Houston, Texas

CHICAGO



Magneto Switch-Boards for All Classes of Service, Multiple and Non-Multiple

Each part of our Magneto Switch-Board has been especially designed to construct a Board in compliance with every demand of a Modern Exchange.

If you are from Missouri or any other state and write us that you are interested in Switch-Boards we will gladly assume the "Burden of Proof" and "Show You" that this equipment is in a class by itself, unequaled for appearance, efficiency, durability, design and accessibility.

HAS YOUR DROP A FIXED POLE PIECE AND A PERMANENT AND RELIABLE ARMATURE ADJUSTMENT?

Sole Manufacturers of North Manual Apparatus
Common Battery and Magneto

Cracraft, Leich Electric Co.

Genoa, Ill., U. S. A.

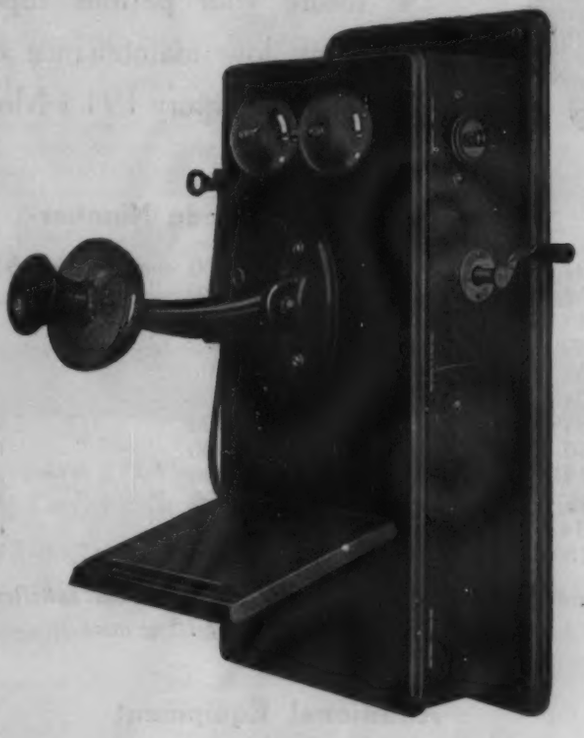
THE DEAN ELECTRIC CO.

LOOK FOR "DEAN" WHERE "QUALITYS" SEEN.

"DEMO" Telephones

The MOST COMPACT bridging telephone, using full sized efficient apparatus, on the market. (Size of backboard, 9-⅛ in. by 20-⅛ in.), yet the equipment is more accessible than in other types.

FEATURES: Dean Indestructible transmitter and receiver; removable lever hook switch; removable transmitter arm; non-sticking self-contained ringer; powerful generator, mounted so crank can be turned without skinning the fingers on the wall; removable type lightning arresters; Fahenstock battery clips; bushed cord and line wire holes; no circuit portion of apparatus exposed; inside binding posts (no "Dinky" and breakable clips for line and cord), battery locators to prevent short circuits, etc., etc. Built of the celebrated Dean indestructible parts, giving the longest possible life and practically no maintenance or operating cost.



The DEMO Telephone is regularly furnished complete with two high grade DRY CELLS, and with or without an efficient lightning arrester; ready to attach to the line.

Ask for Bulletin No. 107

KANSAS CITY MISSOURI

MAIN OFFICE & FACTORY
ELYRIA OHIO.

SAN FRANCISCO CALIFORNIA

Century 1913 Models

¶ The Century 1913 Model No. 65 Compact Telephone contains all the refinements and useful improvements in Local Battery Telephones.

¶ It is recommended and guaranteed for dependable service, under your operating conditions.

¶ Insure your patrons superior service and your company low maintenance cost by equipping your lines with Century 1913 Model No. 65 Telephone.

Always Order by Code Number

No.	6501	Series	3	Bar	Generator	80	ohm	Ringer,	$ 8.00 each
"	6502	"	4	"	"	80	"	"	8.35 "
"	6548	Bridging	3	"	"	500	"	"	9.30 "
"	6549	"	3	"	"	1000	"	"	9.45 "
"	6503	"	4	"	"	1000	"	"	9.70 "
"	6504	"	4	"	"	1600	"	"	9.90 "
"	6533	"	4	"	"	2000	"	"	10.10 "
"	6550	"	4	"	"	2500	"	"	10.25 "
"	6515	"	5	"	"	1000	"	"	10.05 "
*"	**6505**	"	**5**	"	"	**1600**	"	"	**10.00** "
"	6534	"	5	"	"	2000	"	"	10.45 "
"	6518	"	5	"	"	2500	"	"	10.60 "

Prices are F. O. B. Buffalo, N. Y., and include batteries. Special quotations made on lots of 10 or more.

Additional Equipment

For " Sure Ring Through " Condenser	25c. additional
For Push Button secret ring to central	25c. "

When ordering push button for grounded system, please so state in order.

*** Century Leader for June and July**

All Century Telephones are packed in reinforced paper cartons, making a saving of 30 to 40% in freight charges

CENTURY TELEPHONE CONSTRUCTION CO.

Buffalo, N. Y. *Bridgeburg, Ont.*

Please tell the Advertiser you saw his Announcement in TELEPHONY.

The Only Cable Hanger that Will Meet Every Requirement

Fig. 1

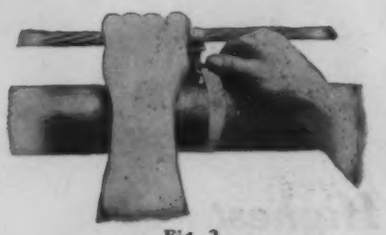


Fig. 2

Matthews Cable Hangers are the only hangers made that fit the following specifications:

"Must have separate grip on the messenger and on the cable, i. e., the locking of the clip either on the messenger or on the cable must be independent of the other. No ends to be cut off after installation. No short kinks or ears in the design. The clip to have a life as long as pure zinc will have. Each clip to be able to stand a dead weight of at least 100 pounds when installed. So designed that when installed, the distance between the cable and the messenger will not exceed one inch and a half. It must be sightly to the eye. It must not cost more installed than other devices for hanging cable. It must be easy and quick to install. It must require no tools for its installation."

Matthews Cable Hangers are proving their money-saving features to an increasing number of Operating Companies each week. The following names are few of the many users:

The Mexican Tel. & Tel. Co., Mexico City, Mex.
Home Telephone Co., Houston, Tex.
Illinois Telephone Co., Jacksonville, Ill.
Home Telephone Co., Mobile, Ala.
Connersville Telephone Co., Connersville, Ind.
Citizens Telephone Co., Circleville, Ohio.
Home Telephone Co., Chillicothe, Ohio.
Iredell Telephone Co., Statesville, N. C.
People's Home Telephone Co., Leavenworth, Kans.
Pocomoke Telephone Co., Pocomoke, Md.

It will pay you to adopt Matthews Cable Hangers on all future work

SEND FOR FREE SAMPLE AND PRICES TODAY

3718 Forest Park Boulevard
SAINT LOUIS

DISTRIBUTORS FOR CANADA:

The Northern Electric & Manufacturing Company, Limited

Montreal Halifax Toronto Winnipeg Regina Calgary Edmonton Vancouver

THE TWENTIETH CENTURY TELEPHONE

4,000,000 Calls Every Day

are made over this Telephone

Highest Efficiency

Superior Service

Minimum Expense

Satisfied Subscribers

The AUTOMATIC system of Telephony is used by over eight foreign governments, while private companies in 23 States of the United States are using it. All told there are more than 325,000 AUTOMATIC 'phones in service today, each averaging 12 calls per day, or a total of nearly 4,000,000 calls.

AUTOMATIC ELECTRIC COMPANY,

CHICAGO.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

THE TWENTIETH CENTURY TELEPHONE

3,500 Operators Would Be Needed

to do the work of this little dial

Never Goes On Strike

Never Gives Wrong Number

Nor Asks More Pay

Nor Becomes Impertinent

The salaries of these ("A" and "B") operators would approximate at least $1,200,000 a year, or 5 per cent on $24,000,000. With the AUTOMATIC system none of these operators are needed. Are you availing yourself of your share of this economy? We are ready to tell you how you can do so.

AUTOMATIC ELECTRIC COMPANY,
CHICAGO.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

PARANITE

The Standard for Telephone use

Rubber Covered Wires and Cables

Braided, leaded and armored cables; plain and braided copper and iron wires of any number of conductors *Manufactured by*

Indiana Rubber and Insulated Wire Company
JONESBORO, INDIANA

AMERICAN CROSS-ARM CO.

CHICAGO

OKONITE
TRADE MARK
REG. U.S. PAT. OFFICE.

OKONITE
INSULATED
WIRES & CABLES

The STANDARD for RUBBER INSULATION
THE OKONITE CO., 253 Broadway, New York

Cut represents a Model 280 Miniature Precision, Triple Range, Portable Volt-Ammeter—Six Instruments in One.

See This New Weston Portable Instrument

These New Miniature Precision Instruments
are masterpieces of the instrument maker's art in very small instruments suitable to be carried in the pocket

Note the Low Prices

Voltmeters or Ammeters,	Single	Range, 1 Inst.	$12.50
Voltmeters or Ammeters,	Double	Range, 2 in one	14.50
Voltmeters or Ammeters,	Triple	Range, 3 in one	16.50
Volt-Ammeters	Single	Range, 2 in one	19.00
Volt-Ammeters	Double	Range, 4 in one	23.00
Volt-Ammeters	Triple	Range, 6 in one	27.00

WESTON BULLETIN No. 8, containing full information regarding these and Miniature Precision Switchboard Instruments, a selection from over 300 types and ranges, is offered in these remarkable Instruments.
Thirty page Bulletin will be mailed upon request.

WESTON ELECTRICAL INSTRUMENT COMPANY
Main Office and Works: Newark, N. J.

New York, 114 Liberty St.
Chicago, 1504 Monadnock Block.
Boston, 176 Federal St.
Philadelphia, 342 Mint Arcade.
Birmingham, Brown Marx Bldg.
St. Louis, 915 Olive St.
Denver, 231 15th St.
San Francisco, 682 Mission St.
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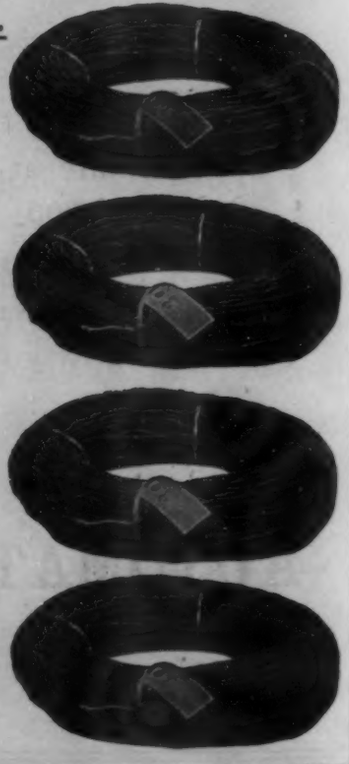

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Telephony.

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Increasing Use of Telephone by Railroads.

The important part the telephone is playing in the operation of railroads is indicated by the papers presented at the 32nd annual meeting of the association of Railway Telegraph Superintendents, which was held in St. Louis this week. Out of the eight papers presented at this meeting, seven of them dealt in whole or in part with the telephone and its use in railroad work.

It is now recognized by most railroads that the telephone has come to stay as an aid in carrying on their business. In many cases it has entirely replaced the telegraph for train dispatching purposes and telegraph lines are not kept in operating condition even for operating use. Railroads which have installed it on part of their mileage are extending the lines to cover their entire systems. Its many advantages are being acknowledged by those who most vigorously opposed its use by the railroads.

A Word About Better Rates.

In these days of industrial unrest we hear much of the justice, the necessity of "a living wage" for the working man. The great problem of the age is to secure for him who renders the service, the big best possible recompense. On every hand are heard grumblings of the high cost of living, which, perforce, lead to demands for better pay. Down in Washington the men placed in power last November are struggling with the tariff question to relieve the situation.

The telephone is not immune from the same vexations. In too many cities and towns the company rendering telephone service is underpaid. It is receiving the same rate that was in force years ago when the number of subscribers served was much smaller and it did not cost near so much to live and do business. Yet the telephone company, like everybody else, has felt the general rise in the price of necessities. Unlike many other businesses, however, it has not been able to reduce expenses to meet changed conditions. On the contrary, the telephone company has gone bravely ahead endeavoring to give good service in many cases on less than what is called "a living wage."

Such companies should demand and receive a better rate. Of course, it will be pointed out that demand would raise the cry, "Here is another item to be added to the already high cost of living," but that it can be justified there can be no doubt. The telephone is as much a daily necessity as street car transportation, electric light or gas, and deserves the same consideration.

Mr. Telephone Man, you are engaged in a great business that serves the public in a really wonderful way. Perhaps you are so close to your work you don't fully realize how great a service you are supplying. Are you getting "a living wage?" If not, go after it. The phrase "worthy of his hire" applies to you, too.

An Encouraging Example.

The theory that the United States is no longer the country of opportunity for the poor man, that money rules the nation and that the trusts oppress everybody who hasn't got a million dollars, has a strong hold upon many people. It is refreshing, therefore, occasionally to run across facts which tend to prove the contrary to be true.

For instance, take the case of James A. Farrell, president of the United States Steel Corporation, recognized as the giant of all the big corporations. Mr. Farrell testified in the government suit recently, and his testimony brought out the fact that he started in the steel business as a laborer and rose by successive steps to foreman, salesman, sales manager, general manager, and finally president. No doubt, he possessed exceptional abilities, but it is certain that he also possessed the old-fashioned virtues of industry, application and stick-to-it-iveness, and the latter, probably, had as much to do with his reaching the top of the ladder as the former.

Right here is where the average man should find a lesson. We may not all be presidents of a billion-dollar corporation, but we all can conscientiously employ the humble gifts we have, and the reward is sure. Many times it is much easier to rail at the rich and powerful, and account for our own failures by declaring the country is going to the dogs, but it isn't the easy thing that wins success. The man who does things seldom has time in which to do much kicking.

Dishonesty Doubles the Journey to Success

By Herbert Kaufman

Dishonesty doubles the journey to success; a crooked path must always be longer than a straight one. If you have the least doubt upon this point, take out your pencil and make the test. You don't need an engineer's degree for the proof—just a degree of common sense. A man is never so strong as when he stands upright. The further he stoops the easier he can be knocked over.

The end of a reputation depends very largely upon the beginning. An unsafe foundation continually threatens everything that rests upon it. A little more time spent in beginning life right, will save years of after-effort in setting right a false start. Reputations must be built of sound timber or they can't last. If there's a flaw in a man's record, it's bound to show. And the more important he becomes, the more certain the disclosure. A faulty beam is never in such danger as when it is called upon to sustain a great weight. Sooner or later failure is sure to mark the man who marks his cards.

Swimming against the tide requires more skill and endurance than swimming with it. The man who isn't straight puts a terrific handicap upon himself. He must play tug-of-war single-handed against all society. The strength and resource that can successfully hold out against the organized opposition of public sentiment, could accomplish tenfold as much with the co-operation and good will of everybody arrayed in his favor.

Every now and then we hear Weak-kneed Shallowbrain sophistically remark: "Don't tell me that honesty pays. Look at 'So-and-So'! See what he has accomplished! And everybody knows how he made his money."

But Shallowbrain doesn't pause to realize that if "So-and-So" had not paid the penalty and did not wear the livid brand of disrepute, he would not be able to quote his record.

Prison bars are by no means the ultimate punishment. Iron gratings are easier for some men to endure than the grating contempt of their associates.

Wealth shrinks in value when its possessor is despised and distrusted. Its purchasing power shrivels.

Every dishonest dollar leaves a trail as plain as that of an anise bag, which eventually leads up to the man who carries it.

Fate is a creature of whims. In her sardonic humor she frequently postpones her settlement day to increase its hardship. She often lulls the cheat into a sense of security and, after permitting him to understand and aspire for the finer things of life, she drags him down to his earlier level and collects her debt with a frightfully compound interest.

An obscure man attracts less attention than a well known figure. The bigger the crowd around the pillory, the more shameful the emotions of him who stands in it.

There's only one way that's right, and all the other ways are wrong.

Success does not cut her rates—her terms are net—she does business on the one-price system.

All the noteworthy achievements in commerce and in art were soundly conceived and accomplished through hard work and honorable effort.

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Train Dispatching—The Telephone in Railroad Business

Comparative Data on Telephone and Telegraph for Dispatching and Other Business—Telephone Practice of Pennsylvania Railroad—Benefits Derived From Telephone Use—Paper Presented at Annual Meeting of Association of Railway Telegraph Superintendents at St. Louis

By J. C. Johnson

Train dispatching was first introduced with the telegraph as a means of communication on the Erie Railroad in 1850, as has been brought out in previous papers, and which event has been appropriaately celebrated this last year. It is believed that some of the honor and glory which has

Fig. 1. Standard Shelter Box of Pennsylvania Railroad.

gone to the Erie Railroad on account of this fact should have been shared with the Pennsylvania Railroad, as the method of handling train orders by telegraph was developed on the Belvidere-Delaware Railroad, a division of the P. R. R., independent of any similar work carried on by the Erie Railroad and without any knowledge of what they were doing. This was carried on by Mr. Welsh, superintendent and engineer, and Mr. Anderson, assistant superintendent. The rules developed by these individuals relative to the transmission of train orders by telegraph and movement of trains under those orders, were in force for many years. They formed the basis of the original set of rules which were subsequently adopted by the Pennsylvania Railroad, for such business.

Since that time the handling of train orders and other railroad business has undergone many changes, and while the telegraph was far in advance of other methods in force at that time, the latest developments have been along telephone lines. Twenty-five years after the introduction of the telegraph for train dispatching, the telephone was invented and the question was soon raised as to whether or not this new and improved method could be drafted into the service for directing train movements. It received favor in some quarters, but as a general thing its advantages were not recognized by the people in authority on the different large railroad systems.

Only a few years ago railway officials looked upon this proposed change as a risky, if not dangerous experiment, but their fears were not founded upon facts. The practicability of such use of the telephone had not at that time been demonstrated, and they argued from their experience with it then, which was very limited, indeed. The particular disadvantage was the manner of calling, code signaling being necessary as selectors had not been developed. At the present time the advantages of the telephone are better understood, as experiments and experience have proved its flexibility and adaptability for the purpose of dispatching trains and for handling general railroad business upon the busiest sections of railroad in the country.

The telephone was first used on the Pennsylvania Railroad for dispatching trains in 1897 on the South Fork Branch, which is 32 miles in length. At the time this system was installed, it was believed that special instructions would be necessary to handle this class of business by means of the telephone, but these special rules were not put into effect, leaving it to the judgment of the train dispatcher. With a volume of traffic increasing from an average of four trains daily in 1897 to more than 80 trains daily in about six years, without having an accident due to a misunderstanding of orders was conclusive evidence of the success of this manner of operation.

Railroads of the United States are today among the largest users of telephone service in the transaction of their business, not only with the public at large, but in connection with the internal operation of their systems. This use of the telephone by them is not recent, in fact they were among the first to recognize the advantages of telephone service. On the Pennsylvania Railroad alone, there are approximately 17,000 telephones either owned or leased from the operating companies.

During the past five years great interest has been taken

Fig. 2. Train Dispatching Office, Telephone Equipment Only Installed.

in the use of the telephone in connection with dispatching on the main lines of railway systems. While this is not the only important service which is being performed by telephones on the railroads, it is the one which is receiving the most consideration at the present time.

Although telephone train dispatching was used successfully on some of the shorter lines, where the number of stations made it feasible to signal by means of code ringing, the invention of selective devices by which any one of submitted to all of the systems having a rated trackage of 1,000 miles or more. This basis has doubtless eliminated many of the roads represented here today on which the telephone has been adopted to a greater extent than on

	Single track	Two or more tracks
Miles of main track dispatched by telephone	31,230	7,633
Number of dispatchers' circuits	261	66
Miles of main track dispatched by telegraph	66,638	4,883
Number of dispatchers' circuits	531	78
Miles of dispatchers' circuits (telephone)	31,885	7,423
Miles of dispatchers' circuits (telegraph)	64,590	5,509
Average number way stations per dispatcher's circuit, telephone	31.1	26.3
Average number way stations per dispatcher's circuit, telegraph	22.2	23
Average cost per way station installation, telephone	$58.83, varying from	$40.00 to $105.00
Average cost per way station installation, telegraph	22.00, varying from	5.50 to 45.00
Average monthly maintenance per way station, telephone	1.23, varying from	.25 to 3.18
Average monthly maintenance per way station, telegraph	1.91, varying from	.15 to 4.00
Average number of train orders per dispatcher's circuit per day, telephone	77.2	48.5
Average number of train orders per dispatcher's circuit per day, telegraph	56.6	49.7
Number of cases trouble per 100 dispatching and way station instruments per month, telephone	8	
Number of cases trouble per 100 dispatching and way station instruments per month, telegraph	9	
Miles of line with neither telephone nor telegraph dispatching.		
Total number of message circuits, telephone	885	73
Total number of message circuits, telegraph	100	
Total miles message circuits, telephone	869	
Total miles message circuits, telegraph	13,388	
Number of block circuits, telephone	165,402	
Number of block circuits, telegraph	727	266
Total miles block circuits, telephone	195	108
Total miles block circuits, telegraph	12,591	2,632
Average cost per mile circuit, telephone	7,925	3,069
Average cost per mile circuit, telegraph	$85.40, varying from	$23.00 to $175.00
Average cost maintenance per mile circuit per month, telephone	51.80, varying from	20.00 to 115.00
Average cost maintenance per mile circuit per month, telegraph	.378, varying from	.02 to 1.50
Percentage of efficiency due to bad weather conditions, telephone	.482, varying from	.017 to 1.50
Percentage of efficiency due to bad weather conditions, telegraph	94.3	72.8 varying from 50-90
Number of portable telephones:		
Freight trains	268	
Wreck trains	262	
Work trains	124	
Passenger trains	150	
Track foremen	20	
Miscellaneous	168	
Percentage increase in efficiency with portable telephones:	Single Track	Two or More Tracks
Freight trains	37.5	
Wreck trains	40.5, varying from 10 per cent. to 100 per cent.	
Work trains	60, varying from 20 per cent. to 100 per cent.	
Passenger trains	55, varying from 10 per cent. to 100 per cent.	
Track foremen	10	
Miscellaneous	59.5	
Number of telephones in boxes or booths at sidings	3,618	1,637
Number of telephones at automatic signals	70	136
Number of telephones at intermediate points not previously included	624	803
Average distance apart of intermediate telephones	9.16 mi., varying from 1¼ to 30½ mi.	4 mi., varying from 1 to 71½ mi.

Total and Average Figures From 35 Roads, Showing Wide Use of Telephone and Its Advantages.

a given number of offices could be directly signalled on the same line, even when a conversation was going on, really made the telephone practicable in this class of service.

In order to determine to what extent the various large railway systems in the United States were using the telephone in connection with their operation, and to make comparisons between the telephone and telegraph from an operating and maintenance standpoint, blank forms were

some of the larger systems, but some limit was necessary or it would have been well nigh impossible to have secured the data in time to properly arrange it for this meeting. About 50 systems are included in this classification, and it was believed that much valuable information from these and the smaller systems would be developed in the discussion. It seems that many of the roads have been so busy installing their systems, that questions of first costs, maintenance and efficiency have not been sufficiently studied to

enable them to give very accurate information. The total and average figures opposite are obtained from 35 roads, representing 100,934 miles of single track and 14,179 miles of two or more tracks, out of a total of 241,000 miles of single track and 25,353 miles of two or more tracks.

The telegraph is kept for emergency where the telephone is installed on 19 of these roads, and is not kept on five.

Only one road has a system of accounting to show the saving in telephone operation.

These figures would indicate that there were either different items included under some of these headings or that some of the superintendents know how to make a dollar go farther than others. We sincerely hope that those gentlemen with the low maintenance figures will tell us how they do it. Of course, on those lines using some of the more complicated apparatus, more complete equipment, busy lines requiring more operations of the apparatus and consequently more opportunities for wear of parts and changes of adjustment, it is only reasonable to expect a higher maintenance per station.

The foregoing tabulated information is compiled from averages obtained from the different divisions of the Pennsylvania Railroad. It has been developed that in certain instances there is a lack of uniformity on these divisions, which is manifested the same as in the comparison of the data obtained from the different roads.

On nine out of 23 divisions, the telegraph is kept for emergency when the telephone is installed.

	Single track	Two or more tracks
Miles of main track dispatched by telephone	1,480	1,020
Miles of main track dispatched by telegraph	1,566	643
Number dispatchers' circuits, telephone	34	33
Number dispatchers' circuits, telegraph	24	21
Miles dispatchers' circuits, telephone	1,480	1,439
Miles dispatchers' circuits, telegraph	1,839	1,074
Average number of stations per dispatcher's circuit, telephone	16	13.8
Average number of stations per dispatcher's circuit, telegraph	21	12
Average cost per way station installation, telephone	$128.00	
Average cost per way station installation, telegraph	31.00	
Average monthly maintenance per way station, telephone	3.35	
Average monthly maintenance per way station, telegraph	1.75	
Average number of train orders per dispatcher's circuit per day, telephone	32	22
Average number of train orders per dispatcher's circuit per day, telegraph	52	37
Number of cases trouble per 100 dispatching and way station instruments per month, telephone	28	
Number of cases trouble per 100 dispatching and way station instruments per month, telegraph	5	
Miles of line with neither telephone nor telegraph dispatching	145.2	25.5
Number message circuits, telephone	51	
Number message circuits, telegraph	155	
Total miles message circuit, telephone	1,902	
Total miles message circuit, telegraph	7,326	
Number of block circuits, telephone	184	201
Number of block circuits, telegraph	63	33
Total miles block circuit, telephone	1,980	1,149
Total miles block circuit, telegraph	744	413
Average cost per mile circuit, telephone	$130.00	$59.50
Average cost maintenance per mile circuit per month, telephone	$0.81	
Average cost maintenance per mile circuit per month, telegraph	.32	
Percentage efficiency due to bad weather conditions, telephone	95	
Percentage efficiency due to bad weather conditions, telegraph	83	
Number of portable telephones;		
Freight trains	0	
Wreck trains	63	
Work trains	44	
Passenger trains	4	
Track foremen	138	
Miscellaneous	47	
Percentage increase in efficiency of crews with portable telephones:		
Freight trains	0	
Wreck trains	45	
Work trains	40	
Passenger trains	25	
Track foremen	45	
Miscellaneous	50	
Number of telephones in boxes or booths at sidings	1,304	777
Number of telephones at automatic signals	3	309
Number of telephones at intermediate points along track not previously included	256	675
Average distance apart of intermediate telephones	3 mi.	2⅛ mi.

Data Similar to Opposite Table, Covering Different Divisions of Pennsylvania Road Only.

There is practically no reduction made in the number of telegraph operators at small stations by the use of the telephone.

There seems to be no method of accounting by which the saving in telephone operation is definitely shown.

From a comparison of the average cost per way station installation on other roads and as shown under the Pennsylvania Railroad classification, it is indicated that there is some extravagance in our installations. This is possibly accounted for by the fact that we usually insist upon having an emergency equipment, consisting of a duplicate telephone with proper connections, as well as a patching and test panel installed at these different points, which admits of patching the wires in case of trouble and always having a good telephone available.

A comparison of the cost of telegraph equipment would not furnish much additional information as it, as a general thing, was installed some time ago. Certain changes and additions have been made in the meantime and no definite cost figures were kept.

Monthly maintenance is also an item which varies widely, our average being $3.35 as against $1.23 as shown on the other roads. This higher cost seems to be somewhat in proportion to the initial cost of the way stations, and may be accounted for by our having more complete or more complex apparatus. This might be a point which would bear some investigation and possibly standardization.

The cost of the maintenance of telegraph equipment is somewhat better standardized and our cost compares favorably with that of other roads.

Our lower figures for train orders per dispatcher's circuit per day are possibly accounted for by our having more automatic signal equipment , which would tend to cut down this average figure.

The number of cases of trouble in our way station and dispatching instruments shows up very high as compared with the average of other roads, with possibly the same explanation as holds for monthly maintenance.

Under average cost per mile of circuit, the figures differ widely. This is probably accounted for by the different items being included, some considering only the wire, pins, insulators and labor; others possibly including the placing of cross arms, etc.; some using copper wire where others base their cost on iron wire.

From the figures obtained on other roads than the Pennsylvania Railroad, the cost of maintenance per mile of circuit per month is hardly a fair average, as this shows the telegraph higher than the telephone, when in reality it should be about one-half, on account of there being only half the wires and insulators to maintain. Also that many of the long and important circuits are operated as simplex or composite, which would tend to further complicate the division of maintenance charge.

The percentage of efficiency due to bad weather conditions would indicate that there was possibly some misunderstanding, as the figures vary between quite wide limits. It is a well known fact that the telephone will operate very well during foggy or rainy weather, while on account of the higher voltage being used for telegraph, there is a sufficient leakage over the insulators to ground to seriously interfere with its operation, and correspondingly reduce its efficiency.

None of our divisions is at the present time using portable telephones on freight trains, although these are used quite extensively, as will be noted on the other roads. A certain increase in efficiency of crews on some classes of trains is sure to result from the use of these portable instruments, as the crews are then enabled to receive their orders without any appreciable delay, and their movements can thereby be more readily and effectively directed.

Nearly all of our divisions are equipped with intermediate telephones in boxes or booths at sidings, which enable the different train crews to obtain orders for movements directly from the dispatcher, or from the nearest town or block office.

The number of telephones located at our automatic signals, especially on those sections of our road having two or more tracks, is very large compared with the other roads.

Spacing telephones located at intermediate points not included in the previous classifications, are evidentally being installed on many of the roads. From the figures obtained it would seem that they are not spacing them as closely together as on the Pennsylvania Railroad. We find these of great value on many occasions, and have devised special boxes and booths for installing them.

Our standard shelter box is shown in Fig. 1, together with the method of attaching it to the iron supporting post which is set in a concrete foundation. The hinged door is intended to shelter a man using the box and when closed makes the box practically waterproof. This door also operates a switch which automatically cuts the telephone on and off the line.

A special wall telephone has been developed for installation in the shelter boxes and booths which we believe is going to give us excellent results. It is equipped with an insulated transmitter and all exposed metal parts are insulated, including the generator crank, switch hook and transmitter. The receiver has concealed binding posts. The windings of the receiver, induction coil, ringer, and generator armature and cords are given a special moisture-proof treatment. Exposed metal parts, which are ordinarily nickeled, will be finished in a dull black. The transmitter battery is contained in a compartment under the writing shelf, which also has a space for forms or blank paper.

The use of the intermediate telephones at sidings, at automatic signals, and at regular intervals between these points, makes the provision of the portable sets on trains unnecessary to a certain extent.

As a rule we have not maintained the telegraph for emergency when the telephone has been installed for dispatching purposes, although in some instances it is still operative.

In most cases we have found it possible to dispense with one train dispatcher, where telephone operation is employed on our lines, when there are two or more regular dispatchers in the office, if they have no other duties which demand the services of the additional man.

It is evident that the other systems have the same difficulty in showing a saving in operating or dispatching by means of telephone as the Pennsylvania Railroad. We know it is a saving and that it is quite appreciable, in fact, that it increases the train movements, thereby reducing the overtime and increasing the car mileage per day, but these facts are difficult to represent in dollars and cents from any regular office accounting. In the reports which we obtained from the different roads in the preparation of this paper, Mr. Little of the Great Northern, very kindly submitted some figures showing a saving effected by telephone train dispatching on that system. From his computations he showed a saving of approximately 15 per cent. on the investment, and this is something in which we are all vitally interested. One item which he has shown in dollars is saving due to acceleration of train movements, a total of $85,100 per annum.

One feature which probably has determined more or less the reluctance of some of the companies in adopting the telephone more extensively for the various phases of opera-

tion, is the low annual rental of telegraph lines and equipment, which are leased from the large operating companies as compared with the cost of telephones for corresponding service and the necessary lines which would have to be constructed. The modern pace seems to demand a higher

Fig. 3. Dispatching Equipment Installed in Single Case.

output per man, to maintain high standards of efficiency and accuracy, and in many cases a raise of present standards. The telephone seems to be the best solution for the reasons brought out in papers previously read on this subject, and it is believed that it is only a question of time before many of the other systems will change to telephone operation.

As telephone dispatching equipment has been in a state of development on most of the large systems, there has necessarily been a lack of standard specifications. But we believe that at the present time the installation of such apparatus has been so standardized and the equipment reached such a development that standard specifications for its installation could well be prepared.

Fig. 2 shows the train dispatcher's office in the Pennsylvania station at Pittsburg, in which telephone equipment only is used. At the left of each dispatcher there are duplicate jacks associated with the dispatcher's circuits and wired so that the chief dispatcher may plug in on any of them. It will be noted that an extra dispatcher's position and equipment is provided. This is used in case of emergencies, such as wrecks, when it is desirable to split up a dispatching section. The emergency position is wired to the test panel so that it can be used on any line.

Another train dispatching installation is shown in Fig. 3. This is located at 30th street, Pittsburg, South Side, on the Monongahela division. In this installation it will be noted that much of the apparatus is combined in a single case, making a very near arrangement.

Transmitter Battery: On our main line the dispatcher's transmitter battery is usually a four-volt storage battery. In some instances the caustic soda cells of large ampere-hour rating are being tried. Emergency battery is also provided.

Selector Battery: This varies from 110 to 240 volts, depending upon the length of the circuit. An emergency selector battery is maintained in most cases. It is always kept in good condition and available for use in case the regular battery is in any way crippled. This is either in the form of a duplicate storage battery, dry cells, or duplicate connection from another power source.

Loud Speaking Receivers: We have conducted some experiments with loud speaking receivers with a view to relieving the dispatcher of the burdensome head receiver and providing him with a substitute to use during lightning storms. The snapping or crackling noises of static discharges during these storms become very annoying with the standard head equipment, and while they may not be altogether dangerous, they are at least objectionable. It is possible that some of the dispatchers have expected too much from the use of the loud speaking receiver and have thought that it should be readily heard when they are some distance from it. The receiver should be arranged to be heard at a distance of about six inches or a foot from the ear, when the operator is directly in line with it. There is quite a field for development in this particular part of the apparatus, and we are confident that something will eventually be developed along this line which will be the solution.

At all of our dispatchers' offices, we have emergency equipment kept in reserve and always in good repair, so that it can be readily put into service in case of failure. In some instances an emergency dispatcher's circuit is maintained over the entire length of the section or division, and switching apparatus makes this available at any time. When these circuits are not maintained the dispatcher has access to the message circuits in the same manner.

Line Construction: Our standard line wire is No. 9 B. & S. hard drawn copper, and we believe that the construction followed by our people is second to none. A considerable portion of our circuit is now run in paper insulated, lead covered cables through towns and cities where we have very heavily loaded lines, or where the local regulations restrict open wire construction.

Protection: The protective equipment is practically the same as that used by the operating Bell companies. On some of the more exposed portions of our lines, we are installing auxiliary protectors on the poles. These are usually located on the top cross arms. It is intended that they should operate

Fig. 4. Way Station Having Both Telephone and Telegraph Equipment.

on lightning discharges and high voltage crosses only, for the purpose of relieving the regular protection located at cable boxes or at entrances to offices.

Transpositions: The lines are very carefully transposed and each line is given a special study to eliminate all noise

and cross talk. Where our lines parallel for some distance high tension lines, or where there are high tension crossings or other local causes for trouble, special transpositions are cut in to eliminate trouble from these sources.

Simplex is being operated on a number of our dispatchers' lines with excellent results.

Another feature which may be interesting is the emergency underground cable installation which is being considered by

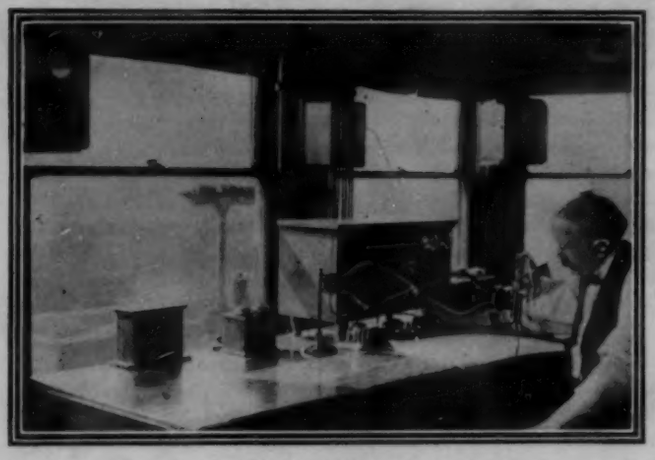


Fig. 5. Block Station Equipment.

our company at the present time. This it is intended to install along our right of way with loops into every tower, block office and way station and equipped with patching panels and suitable signal devices, which would enable us to always signal any station and patch around any sections of line in trouble. We could thus get communication through on the important circuits, including the dispatchers' circuits, no matter what might happen to any one of several sections of the aerial line. This would involve some engineering features which would necessarily have to be worked out to insure satisfactory and successful operation with telephone selectors and also long distance transmission.

Fig. 4 shows a way station installation at Sang Hollow block office on the Pittsburg division, using both telephone and telegraph equipment. The usual telegraph apparatus is shown, together with the protector rack, cordless switching cabinet, and patch panel with the patching cords. The train wire selector, ringing interrupter and extension bell are shown at the top. The main telephone set is shown mounted on an extension arm, while the emergency set is the ordinary desk stand. A foot switch, not clearly shown, is used in connection with the main telephone, while a push button key, immediately to the right of the switching cabinet, is used on the emergency set. An emergency hand generator, shown at the right, is provided in case the automatic ringing interrupter is out of service.

Fig. 5 shows a block station located at Thomson, on the Monongahela division, in which much of the apparatus is combined in one cabinet. An inter-calling key for communication between stations is shown on the left. In this case, both the main and emergency telephone sets are mounted on extension arms.

Fig. 6 shows the equipment of a block station on the middle division. This is similar to the others shown with the exception that another type of apparatus is used. The extension arm shown in this illustration is one devised and made by our people. We also build the cabinets and assemble the apparatus.

The use of transmitter arms or telephone brackets is almost universal on our different divisions, as we have found from experience that they operate very satisfactorily. Some of the advantages which might be mentioned are: Much smaller cord maintenance; more convenient; does not interfere with the use of the desk; prevents the telephone from being knocked to the floor; lessens the local noises from telegraph or other local vibrations; and when equipped with head receiver, the operator is free to use both hands for other work, such as handling train sheets, etc. There are practically no objections.

At the way station as well as at the dispatchers' offices, an emergency telephone is kept in reserve and in good condition for reasons self evident.

Methods of wiring to offices from the line, depend somewhat upon the total number of wires entering the office and its location. In case the tower or office is on the opposite side of the track from the telephone line, the wires are usually carried underground and either in rubber insulated or paper insulated lead covered cable, properly installed in iron or wood conduit.

Other stations on dispatchers' circuits besides regular way stations are the yardmaster, road foremen of engines, track foremen, and foremen of wrecking crews. The telephones at the signal bridges and the spacing telephones are connected on lines running to the nearest tower or block office where they may be connected direct to the dispatcher's line.

Limited trains and private cars are also equipped with telephones which may be connected to the local telephone company's lines or to our lines while lying in the large terminal stations. Private cars, as a rule, are provided with instruments which may be used for either common battery or magneto service.

A test panel located in our Tyrone office is shown in Fig. 7. This contains a voltmeter, a milliammeter, a calling key and the usual testing keys and jacks for patching and testing the various lines.

The total number of wires, including the through trunk circuits on our main line, do not enter all test stations but only at intervals of 15 to 20 miles. The block, message and dispatchers' circuits enter all offices and towers, which are usually equipped with test and patching panels. The patching and testing at these points are under the direct supervision of the chief test operator or dispatcher. Jacks in the test and patching panels are numbered. Cords are provided with different colors for different purposes, so that when the test operator or dispatcher gives instructions to the way station operator, there is very little chance of his making the wrong connection. This greatly facilitates the work at these points.

Automatic door switches for booths and shelter boxes have

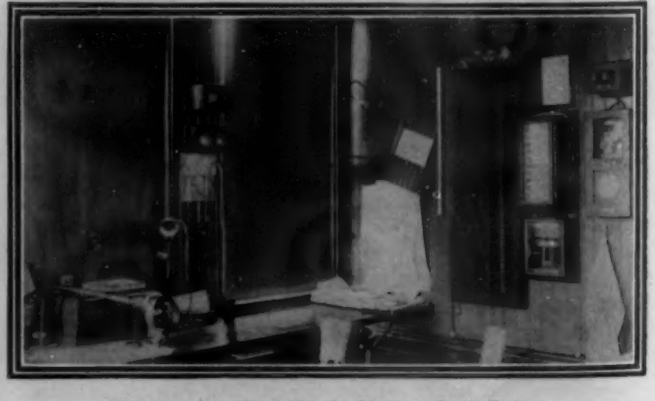


Fig. 6. Another Block Station Installation.

been devised, and are being extensively used. They are so arranged that when the door of the shelter box or booth is closed, the telephone is automatically cut off from the line and the set short circuited. These telephones are provided with the same protector equipment as a regular substation, the protector being connected to the line only when the door is open, or when the telephone is in use.

Emergency Cable: At different points on the road, standard

1,000 ft. lengths of five-pair emergency cable are kept on special reels. This is for the purpose of making quick temporary repairs around any section of line which may have been damaged by storms, slides, blasting operations or otherwise. These consist of 10 stranded conductors of high grade rubber insulated wire made up in the form of twisted pairs. This cable is covered with a substantial braiding or circular loom, which permits of rough handling, such as drawing it along the ground, uncoiling and rewinding on the special reel. The reel is so arranged that both ends of the cable are accessible and may be unwound at the same time.

An equipment for emergency service which has been proposed, but which has not as yet been adopted on account of working out some of the details, is a special car equipped with emergency switchboard apparatus, selector equipment, dispatchers' apparatus, emergency cable, etc. This was intended to be used to quickly restore telephone exchange or dispatching service at any important point, such as division headquarters, where such service might be crippled on account of fire, flood or otherwise, as it always means a considerable delay to obtain this apparatus from the telephone company or manufacturers. Apparatus included in such a car would consist of a switchboard equipped for common battery or magneto service and provided with subscribers' line apparatus, ring down trunks, protective apparatus, and such other facilities as would be required to operate in connection with our own as well as the local telephone companies' systems. The details of this equipment have not as yet been fully developed. Some engineering difficulties would be encountered, but it is believed that they may be satisfactorily solved. The car would also be equipped with selector apparatus of the various makes which are used at different points on the system, and also complete dispatchers' outfits, together with necessary lengths of emergency cable, paper insulated, lead covered cable and facilities for making proper connections. The car would necessarily be of steel construction, and be held at some central point, always available for instant use.

Objections to the Use of Telephone for Dispatching: At some division points and interlocking stations, the operators have been accustomed to listening to the Morse to know the location of approaching trains and thereby regulate their crossover movements. This, of course, cannot well be accomplished by the telephone in its present state of development. If the operator had the head reciver so connected that it would admit of his moving around and always being connected across the circuit, or if a proper loud speaking receiver could be connected similarly across the circuit, it would give him this same advantage. It is a question whether or not such operators should be burdened with all the information which would be obtained by listening in on the train wire at all times. It would be apt to be confusing and would possibly tend to cause more errors than if he has merely the information given him by the dispatcher direct.

The constant wearing of the head receiver for eight hours is not always desirable, as this additional pressure upon the ear produces painful sensations after a time. It is also stated that it causes the ear to be more sensitive to weather conditions than otherwise. This has been overcome to a certain extent by the use of lighter equipment and by the dispatcher so developing his sense of hearing that he may change the receiver from one ear to the other and thereby obtain relief for the tired member.

On the divisions where the traffic is light, a signal circuit is provided which enables the way stations to signal the dispatcher by means of a push button and buzzer. The dispatcher can then remove the head receiver for a considerable portion of the time. The use of the rubber ear cushion is considered favorably by some dispatchers, but does not meet with general approval as it is apt to cause excessive perspiration and after awhile becomes foul. The loud speaking receiver for use as an auxiliary in such cases and during thunder storms would seem to be the solution of some of the troubles reported by the dispatchers. Many of our oldest dispatchers have stated that they have worn the head receiver through all kinds of storms, and have never received any injury from this source, although there is a snapping and crackling sensation which to the more timid might be considered dangerous.

Benefits Derived: In train dispatching the calling of the offices is much faster than by Morse, as one office can be called while the dispatcher is talking to another. It has also been our experience that the bell is a positive signal which the operators will immediately answer, no matter how they may be engaged at the time. Orders can be repeated back much quicker than by the telegraph. Greater details are obtained relative to any emergency than are ordinarily given through a third person, who is necessary in case of Morse. The feature of personal contact by the use of the telephone results in a more cordial feeling between the dispatchers and the different way station operators than could possibly be obtained by previous methods. The use of the chest transmitter enables the dispatcher to use both hands. Reduction in delays to train movements is an important benefit.

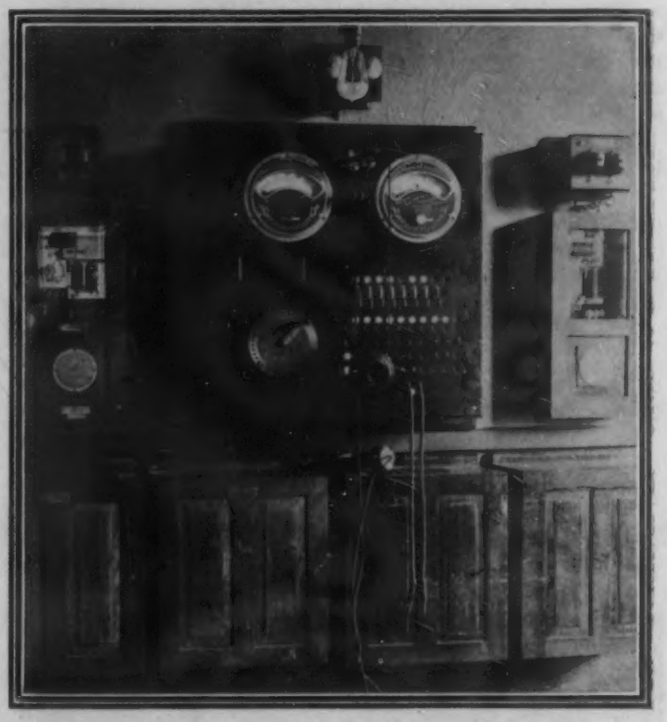


Fig. 7. Test Panel in Pennsylvania's Tyrone Office.

The fact that an employe does not have to have a certain length of experience in learning any operating code, but can qualify for such positions in from one to two months instead of six months to a year, results in a much better supply of more efficient operators. It is estimated that a saving of about 40 per cent. in time is effected over that required for similar operation by telegraph, which greatly relieves the lines and does away with the congested condition of wires, and the contentions between operators for the use of the circuit. The train wire may be cut into the more important yard offices on the division, thus enabling the dispatcher to communicate directly and promptly with the yardmaster or assistant trainmaster, when conditions demand. No chance is given for operator to open the train wire and place it out of service, when leaving the instrument to attend to other business. Wet and foggy weather has no detrimental effect upon transmission, in fact it usually improves it.

As a general thing those telegraph operators who have been opposed to the use of this means of dispatching and

handling train orders before experimenting with it, have become very warm friends after having tried it for some time and have expressed a wonderment that they were able to do without it for so long a period. In many cases they consider it a hardship to go back to the key in case of trouble on the telephone selector system. Many inefficient telegraphers and others suffering from telegraphers' paralysis have thus been enabled to maintain their positions.

ACCIDENTS PREVENTED: It has often happened that some one along the railroad would notice something about a train as it passed which requires immediate attention, such as loose equipment, swinging doors, etc. They have often gone to a telephone at a signal bridge or some outlying point and reported the condition to the nearest towerman, who then took prompt action to display proper danger signals, stopping the train. This information was then given to the crew, who could then make the necessary repairs. The one who noticed the damaged equipment probably could not have given the information to the operator in time to have prevented an accident had it been necessary for him to walk to the nearest telegraph station. The chances are that he would not have taken the trouble to have walked back to the office for this purpose.

One specific instance called to our attention, was that of a trackman picking up a piece of the flange from a car wheel. This was reported immediately from one of the spacing telephones to the nearest office and the train from which it was broken was stopped just as it was about to go down a long, steep grade. No doubt a serious accident would have resulted if this prompt action had not been taken.

The results of the various investigations which have been conducted all go to show that the use of the telephone for railroad operation is continually being extended. It is not rash to predict that it will eventually supercede the telegraph entirely in this class of work, and also for handling messages as well.

A Young Nebraska Operator.

The accompanying illustration shows Miss Helen Herron, the youthful operator of the Burchard Telephone Company of

She Grew Up With the Switchboard as Companion.

Burchard, Nebraska. Miss Helen, just ten years old, is the daughter of the Manager, W E. Herron, and has been handling the switchboard for about a year even during the rush hours. The board she operates was furnished by the Monarch Telephone Manufacturing Co. more than eight years ago, and Miss Helen has really grown up with the board. The illustration shows that the work agrees with her and it is not hard to imagine that the subscribers in Burchard are well satisfied to have their calls answered by such a bright, pleasant little operator.

The Use of Telegraph Selectors.

The use of telegraph selectors to date has not been as extended as it is destined to be. For several years now the selector has been used to some extent on telegraph lines for calling special stations where it has either been hard to raise the operator or the operator has had other duties to attend to and, therefore, was unable to hear the regular Morse call.

Another place it has been used is where the operator is at a station not important enough to warrant a regular attendant on duty all night, but where it is desirable to call the operator at any time, although infrequently. Still another use for the so-called telegraph selector is where Morse telephones either composite or the telegraphone are used, and the induction has to be reduced to a minimum.

All of these uses have been in practical operation for some time. The latest and most fertile field for the selector now, however, is the large central station of the telegraph companies and the railroads. The arrangements in these offices are such that the selector may be used to good advantage. The tables are usually arranged for four or six operators each, and often 30 or 40 lines terminate or pass through each table.

The telegraph selector is connected in series with the line, and the local contact is arranged to operate a relay or other holding device to connect the battery through lamp circuits associated with jacks. The lamp lights, and remains lighted until the operator connects the line with the instrument. By the insertion of a plug in a jack the circuit through the lamp is broken, allowing the holding device to fall back to normal, and be ready for another call.

Inserting the plug also cuts a Morse instrument directly in series with the line and the operator then answers the call and communicates in the regular way. The calling is done from the regular way stations with Morse keys, each station being notified of the particular telegraph call for the line and station. For instance, the call for Chicago might be six, dash, five, dash, or anything else predetermined, and all lines terminating in that office would have the same call.

The advantages of such a scheme can be readily seen. The saving in time and improvement in service in a very short time will suffice to warrant the expense of the arrangement. As a result, there will be an improvement in service all along the line, while the saving in time and temper cannot even be estimated.

There is no question, in the minds of many, but that in a very short time all, or nearly all, large telegraph exchanges will be equipped with apparatus of this kind.

It is little savings like this and others that might be mentioned in the use of necessary adjuncts to business, which in time will help to solve the question of the high cost of living, for in the end the consumer pays the bill, no matter who contracts it.

Suit to Compel Switching of Messages.

Arguments were recently made before Judge Clarence Murphy at Hamilton, Ohio, on the demurrers of the Cincinnati & Suburban Bell Telephone Co., the American Telephone & Telegraph Co., and the Public Service Commission of Ohio to the petitions of the Hamilton Home Telephone Co., which seeks by court order to get the use of the lines of the Bell company into Cincinnati. Attorney General Hogan, for the service commission, submitted a lengthy brief.

The service commission refused the Home company, which is an Independent line, the right to use the Bell lines on the ground that the law did not contemplate such relief.

Railway Telegraph Superintendents Meet at St. Louis

Thirty-Second Annual Convention Marked by Largest Attendance in History of Association, 252 Being Registered—Strong Interest Manifested in Valuable Papers Read and Discussed—Entertainment Features Most Enjoyable and Well Patronized

By Stanley R. Edwards

The thirty-second annual convention of the Association of Railway Telegraph Superintendents was held at the Planters Hotel, St. Louis, the past week. The meeting was opened with an informal reception at the hotel on Monday evening, but it was Tuesday morning when the real active sessions opened, as many arrived on the early morning trains.

St. Louis being centrally located there naturally was a large attendance, the registration list showing 250 names, the largest number ever recorded at a meeting. Mr. Sheldon expressed his pleasure at such a large gathering and said a few words of welcome to the members, ladies and guests. He then called upon Belvidere Brooks, of the Western Union Telegraph Co.

Mr. Brooks spoke reminiscently of other meetings of the association which he had attended. He closed with a plea for co-operation between the members of the association and the Western Union.

C. Selden was next called upon as a former resident of St. Louis, and paid a marked tribute to the city.

E. P. Griffith when called upon responded in a humorous vein.

W. J. Camp moved that the minutes of the last meeting be accepted as printed. The motion was seconded and voted upon affirmatively.

Secretary P. W. Drew then made several announcements relating to the free use of telephone and telegraph by the members during the convention.

After the announcement of the entertainment plans by E. A. Chenery, chairman of the entertainment committee, the ladies were excused, leaving for a short car ride and luncheon at the Jefferson Hotel.

The members of the Railway Telephone and Telegraph Appliance Association who had exhibits, were then called upon to make their announcements regarding the displays. Among those having exhibits were The Automatic Electric Co., Central Electric Co., W. N. Matthews & Bro., and The National Electric Specialty Co.

The exhibits were all of such a nature as to be particularly attractive to railway men, covering apparatus and equipment used both inside and outside offices for telephone and telegraph purposes.

Election of new members followed the announcements of the exhibits. There were a total of 37 new members received of which 19 were placed on the active list. The total number of members is now at the 200 mark.

The report of committees was the next order of business. The reports of the auditing, executive and topic committees were received and accepted as were likewise the treasurer's and the division officers' reports.

The report of the special committee on overhead wire crossings was presented by C. A. Cellar. The association has already adopted specifications for high tension overhead crossings so that the report presented covered specifications for overhead crossings of wire or cables of telephone, telegraph, signal and other circuits of similiar character. It was presented in printed form and the various sections were taken up item by item.

After making a few changes in the specifications, they were adopted. It was decided to submit the specifications for overhead wire crossings to both the American Railway Engineering Association and the American Railway Association.

After lunch the reports of the committees on "resolutions," "form of delivery of messages to trains," and "membership extension" were submitted and approved.

President Sheldon announced that as about 20 applicaitons had been received from cities desiring to obtain the next convention, he would appoint a committee of three to canvass the situation.

C. A. Robinson was then introduced and gave a brief résumé of the paper "Some Facts Concerning Telephone

P. W. Drew. C. A. Cellar. Wm. J. Camp. F. T. Wilbur.

Transmission" prepared by Elam Miller and himself. The paper which will be published in a future issue of TELEPHONY gave an outline of the telephone transmission problem especially as applied to railroad circuits. The various factors which must be considered, such as switchboard and apparatus losses, substation loop losses, etc., were discussed. The various grades of transmission required for the different clases of service were touched upon as was also the question of interference from other currents. The value of careful maintenance was pointed out and the influence of various other factors, such as duplex cable and loading, was discussed.

M. H. Clapp, in the discussion, brought out the importance in transmission of capacity, resistance leakage and other factors which could be avoided. He emphasized the importance of considering switchboard losses and also the loss due to improperly designed operators' sets being cut in on a circuit.

He advocated 26 miles of cable as a limit of transmission instead of 30 miles, the generally accepted standard. Attention was directed to several points to be considered in using phantom circuits. He also pointed out that the maintenance of the telephone circuits could be improved upon.

Mr. Robinson in closing the discussion answered a number of questions in regard to the various curves which accompany the paper.

J. C. Johnson.

In the absence of J. C. Johnson, the paper on "Use of Telephone by Railroads for Dispatching Trains, Handling Messages, etc.," which appears on other pages in this issue, was read by I. C. Forshee.

The discussion of this paper was opened by Wm. Bennett, who directed attention to the fact that the proportion of railroads reporting telephone dispatching on two or more tracks is so much greater than on the single track roads. He referred to the lack of cost data on telephone and telegraph installations. The statement was made that it costs 40 per cent. more to take care of a pair of telephone wires than two telegraph wires. Some reduction in the force of operators can be made with the use of the telephone.

Mr. Bennett stated that a comparison of efficiency of the telephone and telegraph will vary according to conditions. Mr. Selden stated that in the old day of telephone dispatching, a telegraph circuit could be obtained by going in a round about way, maybe as much as 700 miles, to reach a certain point.

Mr. Camp stated that the Canadian Pacific Railroad believed the greatest saving in telephone use was on its single tracks and was endeavoring to equip them first. He gave some figures indicating that telephone installations cost about seven or eight times as much as telegraph. The Canadian Pacific Railroad uses portable telephone sets in place of siding instruments and Mr. Camp gave the reasons for such use.

The Canadian Pacific now has 1,100 miles operated by telephone dispatching.

Mr. Selden did not favor box telephone sets. The Baltimore & Ohio Railroad adopted standard concrete booths as it was believed they were better adapted for use by trainmen. The booths are not large and can be easily handled.

C. S. Rhodes pointed out that the recent floods emphasized the superiority of the telephone over the telegraph. He thought the results obtained during the flood period were 100 per cent. better than they would have been with the telegraph.

Mr. Keenan remarked that messages were handled much better with the telephone. He thought the construction costs in the paper were rather high.

F. T. Wilbur related his experience with concrete booths. He favored their use provided the wiring was well insulated.

J. F. Richardson stated that the Canadian Pacific was using the telephone continuously for message service on one division and was handling more messages than with the telegraph. He also said that storage batteries were being used with satisfactory results on selector service.

E. A. Chenery briefly sketched the equipment used on the Northern Pacific and gave some cost data.

C. Selden gave some figures for telephone installation on a mileage basis.

Several others took part in the discussion which closed the Tuesday afternoon session. During the afternoon the ladies visited Shaws Gardens, the most noted botanical garden in America.

THE BANQUET TUESDAY EVENING.

The banquet Tuesday evening at the Missouri Athletic Club was a most enjoyable affair. The entire party, ladies and gentlemen, were the guests of the St. Louis League of Electrical Interests, Jovian Chapter. The menu was made up of electrical terms which had a familiar ring to them. The expressions used were as follows:

Main Battery Cocktail

Gravity Battery Solution

Choke Coils Insulators Heat Coils

Bull

Repeater

Fuses Irish Quads

C-4-A Salad

Sleet Storm Inductive Disturbances

Condenser Lighting Arresters

Electrolyte

Burn Outs

The toastmaster of the evening was Wm. J. Hiss, general manager of the Bell Telephone Co. of Missouri, and his many witticisms spurred the speakers to make similar efforts. The speakers of the evening were President J. B. Sheldon, who was placed in an especially embarrassing position before he began, by a practical joke; E. S. Bloom, vice-president of the Southwestern Telephone Co.; G. A. Cellar, W. J. Camp and President Beardsley, of the Jovian Order.

The toasts were followed by a ventriloquistic act in which a loud speaking receiver concealed in an electrically operated

manikin played an important part. The operation of the manikin was fully described in one of the December issues of TELEPHONY, so it is unnecessary to describe it again.

Moving pictures were next shown, among them being one taken at the convention last year when the party visited the Edison Works at East Orange. The many familiar faces were loudly greeted as they appeared on the screen.

Several vocal selections were furnished by the latest type Edison talking machine and were greatly enjoyed.

After the singing of several popular songs, the gathering broke up. Music for the evening was furnished by an orchestra composed of employes of the Union Electric Light & Power Co.

THE WEDNESDAY MORNING SESSION.

The meeting opened Wednesday morning with the presentation of a paper on "Inductive Disturbances as Affecting Telephone and Telegraph Lines" by P. J. Howe. Mr. Howe gave a resumé of the paper pointing out that inductive disturbances are the result of electromagnetic and electrostatic induction and showed how both phenomena are produced.

Alternating current power systems, as the source of induction on telegraph and telephone lines, were described, special attention being given to three phase distribution and transmission systems and single phase electric railways.

Means looking to the solution of inductive problems were divided into two classes of investigations, one dealing with prevention and the other with restriction. The first named naturally applies to power systems and the latter to the disturbed systems. Prevention was favored as more desirable than restriction if practicable and economical.

The various schemes for prevention by modification of power systems were enumerated as were also methods for restriction by changes in telephone or telegraph systems. Reference was made to the methods used on the New York, New Haven & Hartford R. R. which operates a single phase, 11,000 volt system. The paper will be published in a future issue of TELEPHONY.

In the discussion, Archibald Wray asked a number of questions referring principally to telegraph operation. E. C. Keenan read a discussion prepared by N. E. Smith of the New York, New Haven & Hartford R. R. Mr. Smith described the troubles the telegraph department experienced when the 11,000 volt single phase system was placed in operation. Compensating transformers were installed and the wires were systematically transposed with each other. The transformers were not exactly balanced due to track defects but when these were remedied by bonding, the lines operated quite satisfactorily. Occasionally interruptions are experienced.

On the Harlem River division where there is a great amount of switching done and when as a result the current varies between wide limits, the telegraph service was quite unreliable especially as the number of switch engines increased. Various expedients were tried but none was successful until an entirely metallic telegraph circuit was used. This eliminated induction effects, although all circuits are still more or less affected by static but not to a serious extent.

The induced voltage on the lines has exceeded 400 volts but without the compensating transformers would probably be greater than 1,000 volts and possibly as high as 2,000 volts. The use of auto transformers as described in Mr. Howe's paper is expected to eliminate probably 95 per cent. of the induction.

Telephone service in the electric zone was considered impossible but experiments were made to ascertain what the conditions really were. A circuit of No. 16 B. & S. twisted pair copper wire was placed 15 feet from the trolley wire and 25 feet from grounds, the circuit worked satisfactorily. The static induction however was too great to keep it free from grounds, as in some places the insulation of the wire was entirely destroyed. Insulated cable was then tried and the results were sufficient to justify building an open wire line.

A circuit of No. 10 B. & S. copper was strung along the telegraph line. It was 10 to 15 feet from the transmission line and was transposed every five poles. Several circuits were afterward installed and operated quite satisfactorily. The static induction on one of these lines was very great and employes had to stand on a good insulator when using the telephone instruments.

To eliminate the static, repeating coils were used as drainage coils but were not satisfactory on account of unbalancing the line. Insulating telephone transformers were then installed with good results. This keeps the static on the line and in order to protect men working on the line, knife switches were installed so as to put it up into sections which could be isolated when necessary to work upon the line.

Mr. Howe in closing the discussion pointed out that duplex telegraph circuits cause heavy induction on telephone circuits. The bridged duplex does not cause as much trouble due to the fact that bridged retardation coil smooths out the wave and eliminates the harmonics. Improvements in lessening the inductive effects on telephone from telegraph lines will probably come through modifications of the telegraph equipment.

The next paper presented was that on "Protection against Lighting and high currents for telegraph and telephone equipment," by M. H. Clapp. Data was collected from the different railroads giving their experience with the various kinds and types of protectors and the replies are summarized in the paper.

The protection equipment for telephone and telegraph apparatus should consist essentially of three parts viz: a high capacity line fuse; an open space cut out or lightning arrester such as formed by the use of carbon or metallic blocks mounted with a separation either in the air or in a vacuum; and a low capacity fuse or heat coil. The application of this apparatus was illustrated with diagrams showing the points at which the various parts should be placed.

The discussion was opened by I. C. Forshee who pointed out the need of adequate protection. He favored equipment that would operate on currents having a voltage as low as 350 to 450 volts. He described protective equipment used by the Pennsylvania Railroad and in closing stated that low cost of maintenance together with safety to buildings should be taken into consideration in deciding upon the type of equipment.

R. E. Chetwood emphasized the need of good grounds as best results are not obtained even from high class protective devices unless the ground is good. The Western Union company is trying to bring the resistance of office grounds to one ohm and possibly to 1-10 ohm. In test offices the ground is allowed a resistance of five ohms as a maximum and in cable boxes the maximum is 15 ohms. His experience was that in general a driven pipe with salt gives the best low resistance ground at the lowest cost.

Another point to which he directed attention was that cable boxes should be absolutely waterproof, if possible. Moisture settles on carbon or copper blocks and is quite likely to ground the line.

In closing he stated that it is impossible to provide a protection which would be satisfactory to use on all circuits.

Next week's issue of TELEPHONY will contain a report of the other events of the convention.

Real Telephone Troubles.

A gambling joint in Los Angeles was recently raided by the police as a result of telephone trouble on the line. While Police Operator Eckels was talking over the telephone with a friend, other voices cut in. The operator listened, and from the conversation which went on secured valuable evidence against men whom the police had been watching for some time. Within 15 minutes seven men were arrested and the conversation which was caught over the telephone, as a result of crossed wires, will be used against them at the trial.

A Quartet of Men Prominent in the Telephone Field

WILLIAM W. HOOVER, director, and general manager of the Sweetser Telephone Co., Sweetser, Ind., was born at Hoovers, Cass county, Ind., and was educated in the district school in Cass county, in the high school at Twelve Mile and later in the normal schools at Marion and North Manchester, Ind. He graduated in the electrical engineering course of the American School of Correspondence in 1907. Mr. Hoover spent most of his time on the farm and in teaching in the district schools. He entered the telephone business with the Twelve Mile Telephone Co. in 1903, managing and operating their Stromberg Lockout system. He left Twelve Mile in 1908 and became connected with the Sweetser Telephone Co. as general manager. At this time the business of the company was a loosing investment but under Mr. Hoover's management the patronage of the company has been increased about 40 per cent and the business is now earning a handsome dividend for the stockholders. Mr. Hoover is also a director and cashier of the state bank at Sweetser.

GUSTAV HIRSCH, consulting engineer, Columbus, Ohio, was born at Columbus in November, 1876. After learning the bookbinders' trade he entered Ohio State University at Columbus, receiving degree of M. E. in E. E. Was Second Lieutenant U. S. Vol. Signal Corps in charge of lines in Havana and actual construction of all lines of Seventh Army Corps. Entered the telephone business as draftsman for the Columbus City Telephone Co., in 1899 and became chief draftsman and engineer. In May 1901 became chief engineer and assistant general superintendent Detroit People's Telephone Co., and in May, 1902, held same positions with People's Telephone Co., Jackson, Mich. From October, 1902 to March, 1903, was chief engineer and superintendent Springfield (Mo.), telephone company. Then entered partnership as Ideal Construction Co., and was chief engineer, general superintendent and manager until 1909, building many toll lines and other properties. Consulting engineer since 1908. Is also president and general manager German-American Publishing Co. He is a member of the Elks, K. P. and the Athletic Club of Columbus, Ohio.

FREDERICK ELLIS BENTLEY, superintendent of telegraph and telephones of the Terminal Railroad Association of St. Louis and subsidiary companies, with headquarters at St. Louis, Mo., was born at Griggsville, Ill., in October, 1868. Mr. Bentley was educated in the public schools at New Hartford and Pittsfield, Ill., and was graduated from the school of experience. He began service with the Terminal Railroad Association of St. Louis 24 years ago and has grown up with the association. From the position of assistant chief telegraph operator he was promoted to chief clerk to the superintendent and from this position was promoted to chief clerk to the general manager. On March 1, 1904, he was appointed superintendent of telegraph. Mr. Bentley is an active member of the Association of Railway Telegraph Superintendents, which is necessarily coming to have a good deal to do with problems of telephony by reason of the rapid adoption of the telephone for train dispatching on steam roads. Mr. Bentley is also a member of the St. Louis Railway Club. He is a Mason.

CARL D. BOYD, sales engineer of the Kellogg Switchboard & Supply Co., of Chicago, Ill., was born at Cambridge City, Ind., in June, 1882, and was educated in the public schools of that city, graduating from the Cambridge City high school. Mr. Boyd's first experience in the telephone business was with the Citizens' Telephone Co., of Cambridge City. After this preliminary experience in the telephone field he was employed by the Pennsylvania Railroad Co., in the year 1899, and continued with that company for a year or more. In the year 1901 he became connected with the Eureka Electric Co., remaining with that company until 1902, when he went with the North Electric Co., of Cleveland, Ohio. His experience with the North Electric Co. extended over a period of five years, or until 1909, when he accepted a position with the Kellogg Switchboard & Supply Co. He has continued in the service of this company for the past four years. His headquarters are at Chicago, Ill. Mr. Boyd is a member of the Masonic order and also belongs to the Knights of Pythias.

The Crying Habit

A Few Comments on the "Infant Industries"—Tariff—Made Beggars—Suggestions for Cure

By J. C. Kelsey

Listen!

The spoiled child is crying, kicking up his heels, and nothing will console him.

He is either going out West to fight Indians, eat worms, or going to Europe to open up a factory!

America's spoiled child is the tender infant called "industry," which has cried unceasingly from birth about something.

One would think that this spoiled child would grow up inside of fifty years, and take on some of the characteristics of a man. But when you read the present cries of the various manufacturers who have been fattening on a high protective tariff, you know that the child has never grown up.

You have reason to be frightened. The manufacturers are all going to Europe. Not one will remain in this ungrateful country—even to the last brick.

It is too bad, really. What would we all do if the filthy, dirty plants would leave us?

Even Illinois is threatened with an exodus of manufacturers. They are going to leave the state! Just when they will move, no one knows, because every other state has already enacted the law they pretend to dislike. Illinois is about the last state in the Union to clean up in any reasonable reform.

At this time, a law which lowers women's working hours from ten to eight is likely to pass. The manufacturers' associations are doing everything but the right thing to kill the bill.

The roar is this: With an eight-hour law, Illinois manufacturers will not be able to compete with other states, yet all the other states have the same law.

But the joke is the word "competition." You and I have been taught that competition is dead.

We hear a good deal about competing with the Chinese labor of British Columbia, and the cheap labor of Europe. But we have never yet understood why a European can buy a sewing machine for $17, while you pay $62.50 for the same article.

Secretary Redfield should call another bluff beside the one he has so nicely forced to a showdown. He simply notified the protesting manufacturers that their threatened wage cuts would be promptly investigated by the government.

I wish he would do something to enforce these moving bluffs, too.

It is said that Marshall Field never paid full taxes on all his property because he threatened to move to New York if Chicago demanded complete payment. After his death, his administrators cheerfully paid up, and not a word has been said about moving.

All the gigantic bluffs should be called.

When Secretary Redfield announced the policy of the government to investigate wage cuts, there was an awful cry. Prominent business men stood on their hind legs at the thought of this invasion upon their sacred rights.

Most of them are managing sweat-shops anyway, paying girls about $6 a week.

It really would be wrong to butt into this type of human slavery. It would be ill-timed interference with the sacred rights of private property.

Is it private property?

I don't think any tariff-fattened property has any private property rights.

When you send an employe on a business trip at your expense, you naturally expect the right to question his expense account. You can bet on it that these kicking business men of Chicago would insist upon it.

If you give charity to a person, you naturally have a right to find out what is done with what you give him. If he buys bread, you feel better about it than if you find he buys a glass of whisky.

Even the beggar at your door expects to be questioned regarding what you give him.

In our country we have unconsciously raised up a great class of beggars. Nice, respectable beggars with silk hats and with nice, warm limousine cars to ride in!

We have the beggardom of Italy beaten many a long city block.

Our beggars are our so-called "infant industries," and the infant cries for alms daily, hourly and yearly. Ever since I could read, I have always heard the pathetic cries of American industry.

My heart used to bleed at the thought of the sufferings of the owners of steel mills, woolen mills, tanneries, shingle mills, soap factories, etc. At no time within thirty-five years have we been free from the cries for alms, favors, privileges, etc.

American industry (a feeble part of it) has been begging for favors from the government for so long that it has become a pernicious habit.

The beggars have been getting away with their hard-luck stories for so long they have come to the belief that their alms are a permanent thing.

The industrial beggars are now having a tantrum. They are threatened with a reduction of their alms. And they are threatening reprisals, a good deal like a tramp who repays his breakfast by murdering your family while you are out in the field.

In other words, the great American tariff-fattened infant threatens to get even by cutting wages, to punish, really, the innocent bystander!

So the government came back at them and said, "Go ahead, we will investigate you and see about it."

No doubt you have been hearing strange noises in your receivers. It is the roar and noise of the beggars who resent such czar-like interference with their sacred rights!

The bigger the kickers, the poorer the pay of their employes.

One would think that the big dry-goods companies of Chicago were run for fun.

The Commonwealth Edison Co., also the Chicago Telephone Co., seem to be running for fun, because we have heard great cries of pain on the part of their presidents, over the Redfield threat.

They resent this unwonted interference with the sacred rights of private property, yet we all know that their employes are not paid so well as they might be.

Yet regardless of the wails and howls and roars, the world is moving onward.

Private industry has its rights as long as it attends to its own business and stands on its own legs. But the very moment that any private industry begs or receives any favors or privileges or alms from the government—or the public, more properly speaking—then that instant that industry becomes a public affair.

And the public is entitled to ask whether the alms go for bread or whisky, or for abnormally high salaries or dividends on great quantities of water.

We have, by a system of privilege, created an oligarchy of silk-stockinged pets who now think they own the earth, a great deal as the dainty French noble did before the Revolution.

It is quite natural for them to whine when they are asked to even up. To their minds this means ruin. That's why cries of "ruin" are so common.

If you believe one-fifth of what you read about the prospective ruin of these great fattened industries, you are misled.

Shoemakers, dry-goods men, tanners, soap-makers, shingle men and other men of fattened industry are wearing sackcloth and ashes.

A day at the Union League Club or the Manufacturers' Association would give you the impression that the Japs had captured San Francisco, and had taken the Santa Fe de lux train to Chicago!

How familiar the wails of these alleged business men sound!

Go in and ask one of them for a job, and you will be roared at and nicely patronized. But the same man is a sucking dove when you suggest that he give up a very unusual privilege.

How gloomy the Boston Commercial Club was when their committee of members came back and reported that the "Indians" had refused to desist from dumping the tea into the harbor!

And the Americans dumped that tea in the harbor in spite of the loud protests and pathetic appeals from Boston business men that such an overt act would hurt business!

When Abraham Lincoln signed the emancipation proclamation, he had numerous protests that the act of striking shackles from human beings would hurt business.

Besides, it was an invasion upon the rights of private property. And so it is today with the liquor traffic, the white-slave horror and the opium business.

Those who interfere are butting into men's private affairs!

Besides, it hurts business.

Business is a tough and hardy plant to have weathered so many cruel storms.

It has nicely survived the Boston tea party, it has seen slavery abolished, and today business men seem able to sit up and take nourishment.

But no! No sooner is one dragon disposed of than another one arises.

A smart part of business is affected by some tariff changes, and it is only a small part.

You remember how $20,000,000,000 is invested in railroads, and hardly $1,000,000,000 in steel factories. Yet a steel man cried bitterly that if the tariff privilege was altered the least bit, he would never spend a dollar to enlarge his plant.

There you are—5 per cent. putting up a big noise about hurting business!

And this is true in our own business, and it's true in the street railway, gas and electric light business.

Every one of you, in any form of public utility service, has no privilege at all, and the most you would ask for is the right to run your business yourself, much less asking the government to help.

The tariff-fattened crowd try to monopolize the word "business," and thereby frighten you into submission.

It seems ridiculous that 5 per cent. of the activities of America should grab off all the favors and hang on to them so grimly, but the spoiled child in any family never can and never will get enough, and in all his life can never see that he has defrauded brother and sister in any fashion.

I am not particularly strong on any brand of politics, but I do believe that special favors should be entirely abolished.

If the Singer Sewing Machine Co. threatens to remove to Europe, I think legislation should be created to force it to go.

Let's make some of these bluffs good!

And if the Singer crowd was forced to go, you would hear long, pitiful stories of confiscation and violation of sacred rights.

The insurance companies, after all the stench of a few years ago, are crying over the income tax because it harms the widow.

Surely, millennium has come! The lion and the lamb, the dove and the eagle, the insurance company and the widow! I certainly have my doubts about the sincerity of the insurance companies' attitude toward the widow. They must have an axe to grind!

Some day you and I may be cried over if we live long enough.

The shingle industry is going to be ruined!

If you have bought shingles lately, you will agree with me that it should be ruined.

A Washington senator made a pathetic plea that high-priced American labor could not compete with cheap Canadian labor. Did you every try to hire any Canadian labor in Regina or Calgary? You will quickly learn that you will pay $5 a day for the cheapest kind.

I think the shingle should be worn out on the Washington senator.

Another horrible example of tariff iniquity is that of a Milwaukee tannery. They are cutting down the ten-hour day to eight hours to keep from losing too heavily in case the tariff changes affect them, crying long before they reach the bridge, and before they even know there is anything to cry over!

The joke of the matter really is that this tannery always has shorter hours in summer!

Tariff matters are usually dull. But when I read interviews from tariff-fattened industry managers, I would get angry if it were not for a sense of humor.

You would think that people would grow up some time and put away childish things. And you would think, too, that the privilegees would have sense enough to let go a little without a fuss.

It will prevent an outraged public from taking it all away some day.

I really wish about 50 per cent. of the fattened indus-

tries would try Europe for a time. They would be glad enough to get back. They would have little fun over there.

Some people are in the public feed-trough so long that they get the idea that the majority of people do not eat at all.

That applies nicely to what is termed "American industry."

I suppose agriculture, railroading and other utility work are only classed as leisurely activities and entitled to nothing.

You never heard of any one being petitioned by an anxious public to go into the manufacturing business, did you?

If they have made a mistake, whose fault is it?

MORAL: Why not even up?

Growth of Independent Co. at Dallas, Texas.

The Dallas Automatic Telephone Co., a year ago, issued its first bulletin which contained the names of about 1,000 subscribers. The company has now issued its No. 4 directory which contains over 10,000 names. On page 4 of the directory the company announces a new feature for the benefit of subscribers—the employment of an operator who will give her entire time to giving the correct time of day. The company has found that many of the inquiries received by the information bureau are from subscribers asking the time. Under the new arrangement the subscriber will simply call X and then 0 and listen and the request is made not to engage the operator in conversation as her only duty is to give the correct time. This new feature has been greatly appreciated by subscribers and on the first day it was inaugurated the company's operators handled nearly 7,000 calls.

The company has also indicated a list of long distance points reached, which is placed in the alphabetical section of the directory. This enables subscribers to ascertain the extent of the company's toll service and at the same time in a measure serves as an index of the alphabetical listing. The directory also contains a numerical and classified business section.

The special fire alarm service of the company was adopted by the board of commissioners after a searching investigation of the merits of the automatic telephone and the system has proven its value as a protection from loss by fire damage. Persons desiring to give a fire alarm call a certain number which rings the city operator at the central fire station who summons assistance from the station nearest the address given, using a special system of private wires provided for that purpose.

National Corporation Properties Sold.

John H. Vercoe, of Columbus, representing a syndicate of capitalists, has bought at judicial sale in the Federal court at Wheeling, W. Va., all the property of the National Telephone Corporation, for $1,000,000. The transfer was ordered by the court upon the presentation of a check for that sum. The sale affects telephone properties in Ohio, Pennsylvania and West Virginia aggregating in value $4,500,000.

It is said that new owners are to organize three separate companies to be known as the Consolidated Telephone Co. of Ohio, the Consolidated Telephone Co. of Pennsylvania, and the Consolidated Telephone Co. of West Virginia. W. C. Handlan is to be president of each.

One report has it that the stock of the three companies is to be controlled by a holding company, with Mr. Handlan as president.

It is believed that foreclosures and sales of subsidiary companies shortly will be made, including lines at Wheeling, Parkersburg, Fairmont, Morgantown, W. Va., and Steubenville.

Earnings of Keystone Telephone Co.

The Keystone Telephone Co., of Philadelphia, has issued a statement of earnings for the combined companies, showing the earnings for the month of April, 1913, as compared with April, 1912, and for the period of four months ending with April 30, 1913, as compared with the same period last year. The statement follows:

	For Month Ended. April 30, 1913.	Year Previous.	For Four Months Ended. April 30, 1913.	Year Previous.
Gross earnings	$103,880	$100,110	$414,243	$394,427
Operating expenses and taxes	53,102	49,930	211,455	197,675
Net earnings	50,778	50,180	202,788	196,752
Less interest charges	25,286	24,962	101,223	100,081
Net surplus	25,492	25,218	101,565	96,671

Independent Rural Association in South Carolina.

The Lexington County Independent Rural Telephone Association was organized recently at Lexington, S. C. George O. Price, of Hollow Creek, was elected president of the association and James B. Addy, of Peak, secretary. The following were named to draft a constitution and by-laws for the new association: D. F. Efird, chairman; Herbert R. Dreher, J. E. Kyzer, W. B. Taylor, Rev. E. J. Sox, Frank L. Corley, Samuel R. George, W. H. Hendrix and J. Luther Smith. J. E. Kyzer was chosen as secretary of the committee and was authorized to draft a constitution and by-laws. Lexington county has almost a complete network of telephone lines and every section of the county can now be reached from the court house. The next meeting of the association will be held on June 7.

Telephone Heroes Receive Medals.

The Ohio legislature has voted to appropriate $100 for the purchase of good medals commemorative of the heroism displayed by J. A. Bell and Thomas E. Green, telephone men, during the recent floods. Bell is district plant chief at Dayton and Green wire chief at Columbus. Their devotion to duty in keeping open the lines of communication is thus fittingly rewarded. Gov. Cox recommended the bestowal of the medals and paid a high tribute to the telephone workers in general for their brave service in time of peril and disaster.

Texas Company Claims a Record Breaker Installation.

One afternoon at 2:30, the Western Telephone Co., of Big Springs, Texas, received an order for the installation of a rural telephone, 15 miles out of town. At 5:30, just three hours later, the lineman rang up and got his O. K. From this it is very evident that the Western company is wideawake and right on the job.

Request for Rate Advance Denied.

The Railroad Commission of Wisconsin dismissed the case of the Casco & Brussels Telephone Co. at Casco, which asked for permission to increase the toll rate from 10 to 15 cents on short distance calls. The Railroad Commission concluded that the present 10-cent rate on short distance calls was remunerative.

Mississippi Independent Telephone Association.

The sixth annual convention of the Mississippi Independent Telephone Association will be held at Corinth, Miss., on June 17 and 18. The program will be available for publication at an early date.

New Long Distance Line in Texas.

The United Telephone Co. has completed its new long distance line between Liberty Hill and Austin, Texas.

The Telephone Inspector and the Troubleman

Continuation of a Series of Articles Begun in the September 7 Issue of Telephony—They Deal in an Elementary and Explicit Manner With Many of the Problems Encountered by Telephone Men in the Operation of Small Exchanges

By A. E. Dobbs

Will Makes an Amusing Mistake.

One day the owner of a plant in a small town near by came into Independence on a visit and, as was natural, he came to visit the exchange. It happened that both the manager and George were away, so the task of entertaining the visitor fell to William, who, nothing loath, not only showed him everything to be seen, but asked numerous questions about his own plant in return.

When George returned that afternoon Will was all excitement to impart the information he had obtained.

"Say," said he, after telling George much that he already knew, "do you know that man didn't know any better than to try to make me believe that a small wire in a toll line would talk better than a large one. He told me he had tried it and knew from experience. He claimed that he got less induction in the telephone. I told him it could not be as there was more resistance in the small wire, but he stuck to it. He thought that because I looked young, he could stuff me with such nonsense as that."

"Ha! ha! ha! ha!" laughed George, "the old fable of the chameleon all over again. You're both right and both wrong. That is a case where theory and practice seem to differ, and yet they are harmonious when all the conditions are understood. Now I know something about that line he was talking about. The instruments used are very sensitve and powerful, being built for heavy toll line service. He did not need such instruments on his little 15-mile line, but he did not know that, and paid an extra price for them. In consequence he got an instrument adapted for about a 1,000-mile service. Now, on short lines, such instruments, being very sensitive, pick up sounds that do not belong to them, and the reaction on the receiver is enough to crack your ear. Faint sounds seem to be loud and loud sounds are magnified into a roar. This you understand applies to a short line. On a long line, however, these faint sounds and overtones become lost on the way, with the result that the articulation, while not quite so loud, is much clearer and more distinct.

"That line of his has about 2,000 ohms resistance in it, and of course he gets somewhat better service than he would with a lower resistance. If, however, he were to connect that toll line to a much longer one, he would probably then realize that something was wrong with his theory.

"You still see in some text books the idea set forth, that

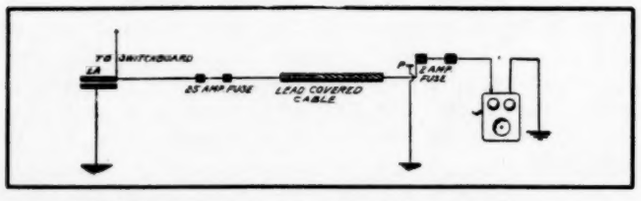


Fig. 70. One Scheme of Lightning Protection.

a small wire is more free from static induction and therefore better adapted for telephone work than a large one.

"Now, you remember I once told you that the difference in static capacity between No. 14 wire and No. 8 was practically very small until long distances were reached, while the difference in resistance, in the case of steel wire, would be more than 50 ohms per mile. You will also remember that I told you how the telephonic resistance was equal to KR. So you see that the slight saving in capacity would be more than made up in the resistance factor.

"You must therefore remember, when a man tells you something that seems impossible, to get all the factors that

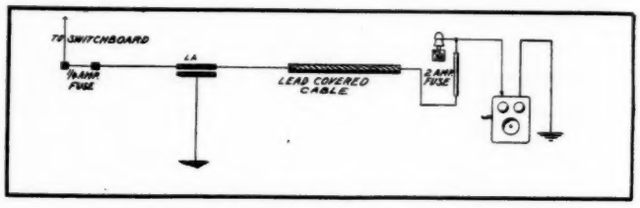


Fig. 71. George's Plan of Protection.

make up the problem. That is practical theory; all the facts. Older heads than yours have made worse mistakes than that. I happened to know the peculiarities of that line as well as the transmitter and coil. You didn't, and he doesn't yet."

Fuses and Protectors.

"Mr. Wilson," said the manager, the morning after his return, "I was looking at an exchange being installed by the Blue Lake company, and the superintendent gave me some ideas in regard to fuses and lightning arresters. According to his views, our plan of placing them is all wrong."

"Does he know any more about it than we do?" asked George.

"Well, that depends; I will show you his plan, and we can talk it over.

"Here," continued Mr. Risk, making a sketch (Fig. 70), "the line comes from the instrument to the cable terminal, in which there is a fuse of from two to three amperes capacity, designed to protect the cable only. In addition to this, a ground strip, *P*, is placed between the rows of fuse clips. Should lightning come in from the line, it will scatter to all the fuse clips more or less, and probably jump to the ground plate. Should a strong current, however, pass this protection and get through the cable, it will be caught and grounded by this carbon block fuse, *LA*, and will surely open the ¼-ampere fuse in the exchange."

"This would leave the current still in the cable ready to do harm," interrupted George. "It would be a much better plan to not use a fuse in that position at the office, simply the carbons with the fuse at the outer end of the cable. Then the cable is protected the same as the office equipment.

"Now, then," he continued, getting out his pencil and a piece of paper, "our plan is slightly different, as you know. In our case I have left the line fuses outside of the cable box, simply because we hadn't room for them on the inside—I hope we can change that some day—and have used the carbon lightning arresters on the inside end and then a fuse. This (Fig. 71) shows the plan. Now, our object in using this scheme is to blow the fuse on the outside in case of a current that would be dangerous to the cable, while the smaller fuse will take care of the drop, should there be ground enough beyond to do any damage."

"Now, hold on a minute, until I tell Callahan's tale more

fully," broke in the manager. "According to his story, he once tried that plan, with the result that a trolley current came in on a line and went through the carbons to ground. The outside fuse on melting did not entirely cut out, and maintained an arc across the terminal. It kept on with its work of destruction until it set fire to and destroyed the whole of the cross-connecting board. About then he made a study of the matter and tried the present plan (Fig. 70), with the result that he has not lost a drop or an instrument in two years in something like 20 different exchanges. It strikes me that, as the proof of the protection lies in the results, his plan is a pretty good one. I guess, George, you will have to acknowledge that you are wrong for once."

"Not yet," laughed George. "Some exchanges have gone along for years without losing a single drop, and then have lost an entire board all at once. Callahan's trouble, in the first instance, was the fact that he did not use a correct fuse. Had he used a fuse at least four inches long, it would have been impossible for the arc to have been established, much less to continue. The fuses we use are enclosed and will not hold an arc. If he used the same fuses that we do he would have no such trouble."

"I still maintain," he continued, "that the proper way to use two fuses in connection with a carbon plate arrester, is to fuse the line at the outer end of the cable with a long fuse of from three to five amperes capacity; the circuit in the exchange to branch first to the carbon arrester, and thence through a ¼-ampere fuse to the board, regardless of the system, be it metallic or common return.

"In some places it is not necessary to use either fuses or lightning arresters on the outside at all. In other places you can not have too many of them. Let us suppose that we have a clear right of way along a certain alley with no other wires near our lines and no line more than 1,000 feet distant from the cable terminal. Now, it is a well known fact that in a town where nearly all the buildings have tin roofs, lightning hardly ever strikes. Even if it did, it would probably scatter and ground when it reached the terminal strips. So in a case like that there is no need of either fuses or carbon block arresters at the cable pole. It is also unnecessary to protect the cable at the cable pole, when the cable does not exceed a length of 500 feet, providing the exchange is protected as I have described.

"Now, here," rapidly making a sketch, "we have a case (Fig. 72) that goes to the other extreme. At first sight it would seem that the amount of protection outlined is excessive. But when all the factors in the case are considered, we find that every piece of apparatus is needed. In cities where the Underwriters' rules are enforced, this form of protection is required.

"Take, for example, cities like Chicago and New York. In the downtown districts where the cable come directly from the underground system into the basement of the buildings, and are then distributed to the various offices through armored conduit, none of these devices are used except the protection in the exchange proper, for it is practically impossible for foreign currents to get onto the line. On the other hand, in the more scattered districts, wires are distributed over roofs, poles and every other place where a wire can be fastened. They are mixed up with all kinds of other wires so that they are exposed more or less to various currents.

"If a stray or weak current, say of .16 ampere comes in through the cable, it opens the heat coil at the exchange and grounds the line. If the current develops into one with a strong pressure, say 300 volts, it will operate the stronger current protection embodied in the carbon arresters at each end of the circuit. The circuit now being grounded heavily at both ends, if the current proves to be of five amperes or over, the tubular fuse at the outside cable terminal will blow, thus throwing the affected line completely to itself upon the pole line.

"The fuse and arrester next to the cable are for its protection, while the carbon blocks and heat coils on the inside of the exchange are for the protection of the board. Where the drop wire from the cable terminal to the subscriber's instrument is not long, no lightning arrester is needed. If, however, there is a considerable length of open wire between the cable and the telephone, protection must be provided for the set. Each company has to study the conditions in its territory and then install whatever protection equipment it deems the most efficient and necessary."

"What is the difference between a heat coil and a fuse?" asked Will, who had entered the room in time to hear considerable of the discussion.

"They are not at all alike," answered George. "A fuse blows on or about a given amperage. A heat coil is arranged in springs, held in place by a soft solder. Upon the passage of a current of a given amperage, the coil becomes heated, softening the solder and allowing the spring tensions to separate the coil. The springs are generally arranged so that the parting of the coil grounds the line wire and operates an automatic signal. The heat coil is much more efficient than a simple fuse."

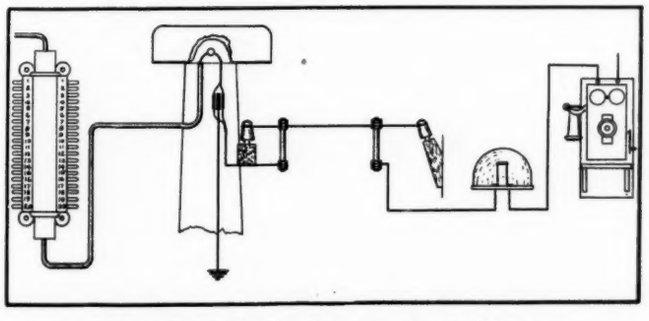


Fig. 72. Protection Plan for Large Cities.

"Why would not a magnetic circuit breaker be a good thing?" questioned Will.

"Because you do not want any more magnets in a telephone circuit than are absolutely necessary."

"Not even a low resistance magnet?"

"There is no such thing as a low resistance magnet to telephone currents. A magnet that will not oppose telephone currents is no longer a magnet," responded George.

"In regard to magnetic circuit breakers, however, a great many forms have been used by the old company in years gone by. That was before the forms of protection which we have been talking of, were invented. The modern, uptodate telephone companies consider the magnetic circuit breaker a thing of the past and its use bad practice."

"But," interrupted Will, "upon toll line work, we often have to make a trip over the line to blow dust out of these carbon blocks. Would not the magnetic circuit breaker remedy that, and would it not be applicable to short toll lines?"

"That is easily overcome," continued George, "by using some of the various types of arresters which are now on the market and which, it is claimed, do not admit of the accumulation of dust. I would not advise the use of the magnetic circuit breaker in any telephone work.

"One thing more; where simple fuses are relied upon, as at line terminals, the fuse should be at least three inches long."

(To be continued.)

Bell Franchise at Elkhart, Ind., Goes to Home Co.

Formal notice that the Home Telephone Co., of Elkhart County, Ind., has taken over the Bell franchise was recently presented to the city council of Elkhart and the transfer was approved.

Proceedings Before Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision of Telephone Companies, Decisions of Courts in Matters Affecting Public Relations of Utilities, and Actions of City Councils Bearing Upon Franchises, Rates and Service

Rebates on Long Distance Messages at Seattle, Wash.

A hearing was held recently at Seattle, Wash., before the Washington Railroad Commission on a complaint brought by John B. Coffey, receiver of the Northwestern Long Distance Telephone Co., of Tacoma, Wash., charging that the Pacific Telephone & Telegraph Co. has, since its merger with the Independent Telephone Co., diverted calls from the Northwestern lines, has caused unnecessary delay in transmitting calls when Northwestern service was asked for, and has discriminated against the company in various ways. The complainant presented a number of witnesses in support of his charges.

J. W. Dando, auditor of the Hotel Butler, testified that the Pacific company had allowed the hotel a rebate of 15 per cent. on all long distance messages originating in the hotel. The Independent company had given no rebates and after the merger for a short time a commission was allowed on all business. In November, 1912, however, the Pacific company had notified the hotel that a commission would be allowed only on Pacific line business. The hearing on this case has been adjourned until June, when the evidence of the defendants will be presented.

The Telephone Litigation in Denver.

In a brief filed with the district court in the suit of the state of Colorado, to oust the Mountain States Telephone & Telegraph Co. from the streets of Denver, District Attorney John A. Rush asks the court to force the company to remove its poles, wires, conduits and telephone system from the streets, alleys and public places within ninety days unless the company procures a valid franchise from the city and county of Denver. The brief argues that the company has failed to show any legal right by which it occupies the streets and alleys; that it possesses no grant under the constitution, which does not purport to make any grant to a telephone company.

The company, the argument continues, possesses no grant from a statute, since a state does not make any grant, but leaves the city the sole power to make such a grant. The company possesses no grant from the city, since no ordinance was ever passed by the council, except that of 1889, and that has expired by limitation of term; and no grant could be made in any other way. It is stated in the brief that since 1909 the defendant has been a trespasser in the streets of Denver, without any right, and that a quo warranto proceeding is the proper remedy. Attorney Rush says that the court can do nothing but hold that the company is in the streets of Denver without lawful right and that it "is now unlawfully usurping and intruding into and exercising a franchise contrary to the laws of the state and in violation of public right, and that judgment of ouster must go."

An agreement has been reached between the Mountain States Telephone & Telegraph Co. and the city attorney of Denver by which the company agrees to take out city permits for the construction of all lines on the understanding that the agreement shall not jeopardize its contention in the courts that the Brown ordinance, approved by the people in February, is not effective, the company claiming to operate under a perpetual franchise.

The foregoing agreement was the result of action by the city in arresting a line foreman of the company for erecting poles without a permit from the board of public works. It was at first proposed to make a test of the case, but City Attorney Bryant decided that the above action pending in the district court would be the test of the ordinance, and upon the company agreeing to take out permits as stated, the case against the line foreman was dismissed.

Public Utilities Law of Idaho.

The new public utilities law of Idaho, which was approved in March and takes effect 60 days after final adjournment of this session of the legislature is somewhat similar to the Missouri act lately adopted and is in many respects a strong and effective measure, says the Electrical World. It provides a public utilities commission of three members appointed by the governor for overlapping terms of six years each, at salaries of $4,000. The commission is provided with a secretary by its own appointment and may employ engineers, experts, accountants, inspectors, etc. The attorney general of the state is charged with the duty of representing the people and the commission in all actions and proceedings under the new act.

Telephone companies are among those under the jurisdiction of the commission, which has power to fix rates, make investigations, inspect public utility properties, regulate service, hold hearings, compel attendance of witnesses and enforce obedience of its rules and orders, subject to penalties for infraction. No public utility may change its rates without 30 days' notice to the commission nor raise its rates without express permission. Rate schedules must be filed with the commission and kept open to public inspection. It provided that nothing in the act shall be taken as preventing sliding scales of charges, provided they have the commission's approval, nor an arrangement for the automatic adjustment of rates in relation to dividends paid to stockholders for a fixed period under like approval. But the commission may revoke such approval at any time for cause.

Every telephone and telegraph corporation must handle its business without unreasonable delay and without discrimination, whether tendered by patrons directly or by other companies with whose lines physical connection has been made or ordered by the commission. No street railroad, gas, electrical, telephone or water corporation may henceforth construct or extend its plant without first securing from the commission a certificate of public convenience and necessity, but exception is made of territory in any city or town heretofore lawfully occupied or contiguous territory not already served.

The penalty for disobeying the orders of the commission is fixed at not exceeding $2,000 for each offense. Every individual offender, either as an individual or an agent of a public utility, is subjected to a fine of not exceeding $1,000 or a jail sentence not exceeding one year.

Rate Question in Nebraska.

Telephone subscribers of Polk, Stromsburg and Osceola, Neb., are objecting to an increase in telephone rates from $1.50 to $2.00 per month made by the Polk County Telephone Co., now a subsidiary of the Lincoln Telephone & Telegraph Co. Objection is made that the advance was authorized by the Nebraska State Railway Commission without hearing and without notice to subscribers.

It is claimed that when the Polk County Telephone Co. was given a permit to operate its line an agreement was reached with the public that the monthly telephone rate should never amount to more than $1.50. The telephone interests are credited with the contention that cities of less than 8,000 population cannot regulate franchise agreements and that therefore the stipulation in the Polk county matter is invalid.

Occupation Tax Reduced at Lincoln, Neb.

The city council of Lincoln, Neb., has reduced the occupation tax for telephone companies from 2 per cent. to 1 per cent.

Merger at Plattsburg, N. Y.

The Ellenburg Telephone Co. and the Beekmantown Telephone Co. have been merged with the Mountain Home Telephone Co., of Plattsburg, according to certificates filed with the secretary of state by I. H. Griswold, president of the Mountain Home Telephone Co.
R. Davidson.

Telephone Rate Case in New York.

A case upon which hinges a readjustment of the New York Telephone Co.'s schedule of rates for telephones through switchboards throughout greater New York was heard recently before Commissioner Martin S. Decker of the Public Service Commission of New York, Second District. Harrison B. Weil, an attorney at 160 Broadway, New York, explained that he had recently entered into a new contract with the company, under protest on the ground of extortionate charges, and he made a statement in support of his contentions embodying a comparison of the charges made by the Bell company in other cities and New York purporting to show that New Yorkers pay something between 25 and 33 per cent. more than many other cities for the same service. In presenting his case Mr. Weil said:

"A point that appeals to me as representing the height of unreason on the part of the company is the charge of $24 annually for each trunk line. In addition to that charge for the trunk lines we must pay $36 annually for a switchboard and $6 for each extension. Since we cannot use the telephone without the wires, it seems as logical to charge for trunk lines in addition to the charge for calls as it would be for you to charge us an admission here and then make us pay for the table and chairs. I am told that the company purchases these switchboards outright for $75—I mean those containing accommodations for about 20 trunk lines and that the receivers may be purchased from an Independent company in Chicago for $2.50, though I understand the Western Electric Co. is paid $5 each for them. I don't know what the stock connection between the two companies is, but if there is none and the company is able to make $1 profit on its investment in each of these receivers from the first year's rental, that appears to be saying enough.

"Figuring on the present scale of charges, a switchboard with two trunk lines on a basis or a minimum of 3,600 messages a year cost $204. I maintain that this figure is excessive. This works out at 5⅔ cents a message. Considering that the telephone company is willing to put in automatic coin collector boxes and takes its chances on obtaining business on a basis of 5 cents a call from the public, this charge is unfair. My investigations have divulged that compared with other cities New York gets a bad bargain—sometimes the worst. A single wire with a minimum of 5,700 messages, costing the New Yorkers $228, in Chicago costs $125 from the Bell company, and $84 from the Independent; in Philadelphia, $90, from the Independent, and $125 from the Bell; in Baltimore, $174 for 5,400 calls; in St. Louis, $78 annually for an unlimited number of calls. Denver's charge is $138 for 5,700 calls, there being a monopoly there. Boston gets the unlimited service for $125 annually."

The hearing in this case was adjourned until June 20.

Public Utilities Law of Maine.

The public utilities law recently adopted by the state of Maine contains provisions, says Electrical World, which cause it to rank among the strongest and most efficient acts of this class in the country, not excluding the law of Wisconsin. Three commissioners are to be appointed by the governor, with the confirmation of the council, for noncoincident terms of seven years each, with a salary of $5,000 for the chairman and salaries of $4,500 for each of the others. A clerk and an assistant are also provided and provision made for other assistants as needed. Authority to inquire into the management of public utilities, conduct investigations and require information thereof, inspect books and records, hold meetings, compel the attendance of witness, etc., are provided.

Every public utility is required to furnish safe, reasonable and adequate facilities and service at reasonable and just rates, taking into consideration the fair value of the property and a fair return thereon, including all rights and plant as a going concern, business risk and depreciation. All unjust and unreasonable charges and undue or unwarranted discrimination are declared unlawful. It is provided that uniform accounts shall be kept in the manner and form ordered by the commission. An annual balance sheet and report, as of June 30, shall be rendered by each utility. Rate schedules must be filed with the commission and also displayed for public inspection. No change in rates may be made by a utility except upon 10 days' notice to the commission and no rates except those on file are lawful. The commission is required to provide for a comprehensive classification of service of each kind, taking into account the quantity used, time when used, purpose of use and any other reasonable feature.

No newly organized telephone, telegraph, gas or electric corporation shall have authority to furnish service without the consent of the commission, in the form of a certificate of public convenience and necessity, and hereafter all public utilities must be incorporated under the laws of Maine. No utility may charge more or less for a given service than the lawful rate, nor subject any patron to undue prejudice or preference, but a utility may rent necessary facilities from patrons or anyone else upon reasonable terms, separate and distinct from contracts for service. Service contracts in force on January 1, 1913, are held valid until expiration of term, but thereafter, or if terminable upon notice by the utility, the commission may direct that they be canceled.

Accidents resulting in the loss of life and occurring upon the premises of a utility, or resulting directly or indirectly from operation or maintenance of the utility system, shall be investigated forthwith by the commission and the latter may make such orders with respect thereto as seem to it just and reasonable. Accident reports must be filed with the commission as called for, but no such report shall be admitted as evidence in a damage suit resulting from the accident.

The commission shall fix a reasonable value upon the property of a utility whenever it deems the same necessary in respect to fixing rates for service. In such work the records of the state in any other department are made available under the act.

Any utility may issue stocks, bonds, notes or other evidences of indebtedness payable at periods of not more than

twelve months after date thereof, when necessary for purchase of property, or construction or improvement of plant, or for refunding lawful obligations, with the consent and approval of the commission. But such commission shall not affect the regulation of rates. No utility shall declare any stock, bond or scrip dividend or divide the proceeds of sales of securities without the consent of the commission.

No utility shall henceforth sell, lease, assign, or mortgage its property, nor merge or consolidate the same, without first securing approval of the commission. However, property not useful or needful in rendering its service may be disposed of in good faith for value. No utility shall hereafter acquire any interest in any other utility without formal consent.

The commission after due hearing and investigation may order physical connections between two or more telephone or telegraph companies for joint through service under joint rates when public convenience and necessity are served thereby, except in the case of points within the same city or town. In like manner and for the same cause the commission may order any utility to rent its facilities to another utility upon reasonable compensation therefor.

The penalties for infraction of the act include a fine not exceeding $1,000 for each act of disobedience under the commission's orders by any officer or employe of a public utility, or for violation of the act; and when an officer or employe violates an order of the commission the utility itself is liable also to a fine not exceeding $1,000. Utilities are also made liable to persons, associations or corporations injured by any unlawful act or infringement of the public utilities law.

Any director or officer of a utility who unlawfully issues securities or misapplies the proceeds of sales of securities is punishable by imprisonment for one to ten years, and for wilful false statement in order to secure approval of security issues such official or director shall be fined not less than $500 or serve one to ten years in prison, or both.

This act becomes effective in respect to public utilities on September 1. The board of railroad commissioners and the state water-storage commission will then be abolished, under the act, and their duties and powers will be conferred upon the public utilities commission.

Convenience and Necessity Bill in Wisconsin.

The Wisconsin assembly this week passed the Keen bill requiring the obtaining of a certificate of convenience and necessity from the Railroad Commission for the duplication of telephone lines in the townships where only one exists. As amended, the bill provides that duplications may extend only to single roads and not to entire townships.

Home Rule Recommended by Illinois Senate Committee.

The senate committee on public utilities of the Illinois legislature has recommended the passage of Senator Glackin's bill, giving cities and villages the right to regulate telephone rates.

Free Telephones in Salt Lake City.

On the occasion of a recent visit to Salt Lake City, Utah, General Manager Burgess, of the Mountain States Telephone & Telegraph Co., asked for the list of free telephones and after a moment's hesitation drew his blue pencil through it, thus signifying that the 50 free telephone users must hereafter pay for the service. He explained that the Interstate Commerce Commission is becoming stern in such matters; that the telephone company is an interstate affair; and that there can be no free telephones beyond those stipulated as such in franchises.

Warren Bogue, city purchasing agent of Salt Lake City, now wants to know what is a free telephone. It is stated under the franchise by which the company operates in Salt Lake City that the municipality is entitled to 50 free telephones and 1 per cent. of the gross receipts of the company in the city. Such free service, at regular rates, amounts to $3,900 and the 1 per cent. royalty amounted to $5,030 during 1912, making a total of $8,930 received by Salt Lake City from the telephone company for its franchise. As against this sum the city pays the telephone company $3,657 a year for service in addition to the 50 telephones given free.

The purchasing agent is exercised over the latter item of expense. In many instances it represents extensions, indexing and other services in connection with the free telephones. Since the telephone company is going to charge for such extensions, the city attorney is asked to determine under the company's franchise just what is meant by the provision relating to a free telephone.

Wisconsin Commission Charged With Discrimination.

A town in northern Wisconsin passed a drastic Sunday-closing ordinance, says Elliott Flower in the Chicago Record Herald. Under its provisions even the local telephone exchange could be closed, and the town officers notified the telephone company that it would have to suspend business from midnight Saturday until midnight Sunday. The company appealed to the commission for advice and assistance. As it was part of a long-distance system, the closing of this office meant more than merely local inconvenience, and the commission notified the town officers that it would be decidedly unwise to attempt to tie up a section of the state in this autocratic way. Thereupon the town officers discreetly ignored the telephone company, but enforced the law as to every line of business that it affected.

A little later the commission received a plaintive call for help from a liveryman in the same town. He was not allowed to do business on Sunday, and the telephone company was. If the commission could keep the telephone exchange open, why could it not do as much for his livery stable? A livery stable, he reasoned, was a public utility affair and properly came under the jurisdiction of the commission, but, unfortunately for him, the commission could not see it that way.

Growth Under Wisconsin Public Utilities Law.

According to the Railroad Commission of Wisconsin, there has been a steady and uninterrupted progress in the direction of larger business and greater investment during the past six years since the public utilities law was enacted. The reports just compiled show that telephone enterprises in 1907 had gross earnings of $3,074,000, while in 1912 the total had reached $5,011,000. This increase amounts to 63 per cent. The plant investment of these telephone companies during the same period showed an increase from $12,996,000 to $18,309,000, or 40.9 per cent.

Postpone Telephone Toll Bill in Wisconsin.

The senate committee on judiciary of the Wisconsin legislature has reported for indefinite postponement the bill by Senator Timothy Burke, of Green Bay, prohibiting the collection of telephone tolls where none were heretofore collected. The bill is a copy of the Schnitzler bill, which has likewise been reported for indefinite postponement by the assembly committee on transportation.

A Telephone System in Jerusalem.

The latest bit of enterprise in Jerusalem, says Telephone Talk, is the beginning of a telephone system. For the first time in all its long history the Holy City hears the tinkle of a telephone bell. The new courthouse at Jerusalem has been connected with the old serai, and the system is to be extended until, first, all official points, and then business houses and residences are supplied.

Practical Subjects—Letters and Discussions

Letters From A Retired Lineman to His Nephew.

Podunk Valley Farm.

Dear Ben:

Spring training for the climb of the Golden Stairs is over in this neck of the woods. But it was a pretty stiff season and we'll remember it for a long time.

I will not say anything about my own spiritual condition and I'm not telling you about the soul-saving endeavor made here to belittle religion in anyway. Religion is a world-wide institution which is recognized by every race, the world has known, in some form. It has continued so long it must be a good thing in any of its forms.

When spring opened up a merry-go-round started business on the east side of the track; then two moving picture shows started and several other transient amusement enterprises came and went until the evening services at the churches were pretty much forgotten by the young people.

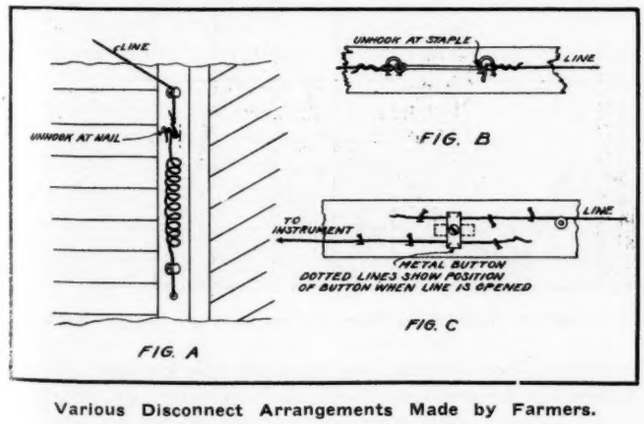
The church people finally got together to talk matters over, and just about that time the Rev. Singer happened along and offered his services. He proposed to hold union revival services, and take the matter entirely upon his own shoulders. He proposed to raise the funds to conduct the enterprise and give the churches 20 per cent. of the amount.

He shipped in a big tent, a pipe organ, a blind organist, a one-armed singer and cornet player and began service along side of the other attractions. He featured the music and solicited local talent which was a drawing card.

He was a money getter from the beginning. Yes, sir! He got money out of people who owed store bills for years back—people supposed not to have any money.

The merry-go-round boxed up its traps and left. One picture show closed about the third week of Rev. Singer's meetings. The other would better have gone while the profit side of the book showed a balance. The people didn't approve of Rev. Singer's burlesque methods, but his contract was in writing, so no one could interfere and the town's share of the receipts was dependent upon co-operation.

Doc. Stuver has been a Methodist all his life and a good one, but he said he had to withdraw his patronage. The Rev. Singer was bound to drive that one nickel show out of the town, regardless. He had everything from a



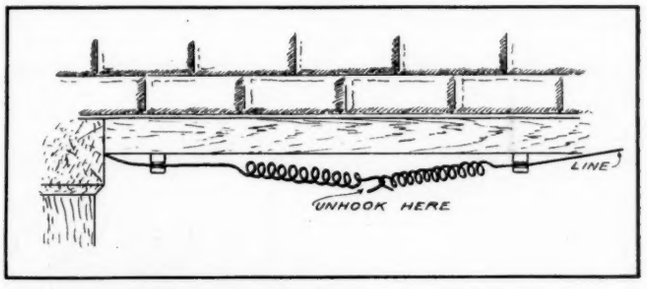
Various Disconnect Arrangements Made by Farmers.

Scotch piper to a Chinese band, but the picture man kept pace. One little accident happened.

Old man Billings, going on 89, went to meeting one evening with his black pipe in his mouth. The pipe with its column of smoke caught Rev. Singer's eye and he asked the old man to quit smoking. Mr. Billings thoughtlessly knocked the fire from his pipe into the dry straw under his feet. Tent, organ and benches all went up in smoke. To everybody's surprise an insurance company paid the loss and a new tent and organ came out the next day.

When finally some South Sea Islanders were billed, the other picture show closed.

With the Islanders came a retinue of parrots and snakes.



A Disconnect Switch Found at a Farm House.

The first night the managerie was placed on exhibition, the climax came. Two of the parrots indulged in profanity, evidently learned on shipboard and were removed to outer darkness. Then later the snake charmer came on the platform with two large snakes coiled around her. Somehow one of them slipped away from her and disappeared in the straw at the edge of the crowd. The blind organist was the first to give the alarm—folks remembered that afterwards. The riot closed the meetings for all time. It was two days before the snake was found lying across the railroad track, cut in three pieces.

The tangible result is new roofs on two of the churches and a new foundation under another.

Don Freeman's house burned down; struck by lightning. He claims the telephone wire carried the lightning and set the fire because a pole half a mile from his place was split into tooth-picks. It cleaned away the pole almost to the ground, leaving the bracket and wire in good condition. Anyway Freeman is looking for damages, which brings up the point whether we furnished proper protection.

It is a matter that got past me when the instruments were installed; also I forgot to put lightning rods on any of our poles. I find that the instruments were supplied with a metal fuse block device to give lightning a path to ground. In addition to this, most of the farmers have invented devices of their own, which, in many cases, were bad for the service.

Their idea is when leaving the house for any length of time or at the approach of a storm to "unhook" the wires outside the building.

After the storm the other night we found one very peculiar case. Tom Daly's telephone wouldn't work. I went out to look at it and found the inside wire open. There was about 20 feet of insulated copper wire between the pin proper and the instrument. It looked all right but when we examined it, we found the copper was missing the full length of the insulation. The metal was fused away entirely and there was only one little burn in the covering. The question in my mind is whether the protector worked or not? Perhaps you can help me out. Anyway Doc is using this case to convince Freeman that his house was struck full and square and not set afire by the telephone wire.

The cats are doing fine and the rats are fast disappearing, but I'm not giving any advice to other folks in

the matter. Doc says to let them fight the rats their own way.

We are planning to show what our swamp land will do. Doc is going to plant corn and potatoes between the stumps on some of the cleared patches.

Your Uncle Dick.

A Farm Company's Telephone "Thrift."

The accompanying photograph shows the care one farm telephone company uses in caring for its lines. The pole in the foreground was spliced out by a house mover, who moved a house under the line over two years ago. He

A Farm Line in Missouri.

took off the insulators at the two poles shown, placed the glass on the end of 1 in. x 4 in. fence board and nailed the plank to the poles. This raised the wire about ten feet higher than the pole, so that he was enabled to move the house under the wire.

In a few weeks the weight of the line bent the plank over and the glass on the farther pole slipped off. The wire has held the bend as shown on the near pole, and it has been in just that condition for over two years.

The company's "by laws" require an annual election of officers in April, but it has never had a change, or an election of officers since the farmers "organized." The vice-president died some four years ago and a meeting was called then and another vice-president elected. A meeting of any kind has not been held for two years.

Some of the farmers put a wire over the line outside of their houses whenever a thunderstorm comes up, to "keep out the lightning." Of course they sometimes forget to take the wire off and as a result have a grounded line. They make a big fuss if they happen to want to use the line, but pay no attention to the cause after the trouble clears up.

They have about 20 telephones on the line, and the "company" rents seven of these to folks living along the route.

A few days ago the batteries in the set of one of the directors played out, so no one could hear them. The farmer got a new pair of cells and had a time to get them in right. Finally when he got so he could tell his neighbors how he found the trouble, he gave a full and complete explanation—trouble shooters, take notice—something on this order:

"Did you find out what was the matter with your telephone?"

"You bet we did."

Neighbor—"What was the trouble?"

Manager. "Well, you know we could hear other people talk, but could not make them hear us at all."

Neighbor. "Yes, I know that, but what caused your telephone to act so funny?"

Manager. "Well, we found the battery that talked out had busted, so we could not make you hear, and the battery that talks in was still all right. That is the reason we could hear all right but couldn't make nobody hear us."

The farm telephone manager saw the "busted battery" and he at once knew it all. His trouble was clear.

W. J. Hall.

Curves Simplified for the Chief Operator.

"Some chief operators have not the proper conception of why peg counts are taken," says M. M. Simmons in the Southern Telephone News. "When chief operators do understand the essentials, the peg counts are not only more accurate but it generally broadens their telephone vision and gives them greater things of which to think.

"For traffic purposes, a 'Curve' may be considered as being a chart to indicate to the eye at a glance, fluctuations or changes in a comparative set of figures; if these fluctuations were not shown by a curve, it would be necessary to actually compare the set of figures by subtracting one from the other and noting the difference. This latter method is cumbersome, not concise and cannot be mentally conceived with the same degree of intelligence as the former.

"For example: Suppose the amount of cash in your purse on the first of each month was as follows:

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
$5	$1	$2	$4	$5	$8	$6	$0.00

and that at the beginning of January it was decided to have on the first of each month $7. Letting the standard of $7 be represented by a heavy straight horizontal line, it can be told at a glance from the curve shown in the illustration when there was more or less than the standard amount in the purse.

"The advantage of a chief operator in being able to read these curves is the same that a person having a timepiece has in telling the time of day over one not having a timepiece who guesses at the time by the position of the sun. In one case, it is judged that an additional operator should be placed at the board from personal observations of the traffic, pronouncing it 'too busy' for the number of operators at the board. This corresponds to having no timepiece, and should a special peg count be taken and sent to the district traffic chief in order that he may make a curve, such a curve would be the timepiece and show the

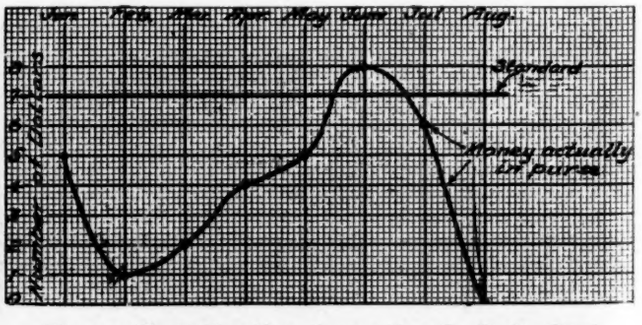


Diagram Illustrating How Curves May Be Easily Read.

necessity, it is assumed, of an additional operator. In determining the number of operators required, the necessity of having the peg counts correct, can readily be seen."

Campers on Rock River to Have Telephones.

Campers along the Rock River near Rock Island, Ill., will this year be able to secure telephone service if they are willing to pay to have the telephones installed, according to the Rock Island Argus. The Central Union Telephone Co. is extending its cables to Sears to provide such connection.

Practical Telephony for the Practical Exchange Manager

A Series of Articles Relating to the Construction, Maintenance and Operation of a Moderate Size Telephone Exchange, Which Began in the Issue of September 21, Expressed in Everyday Terms, Easily Understood—Principles Easily Applied

By H. R. Van Deventer

Instrument inspection and maintenance having been discussed in a general way, the central office equipment will now be considered.

Systematic inspection is absolutely necessary to maintain any equipment at its maximum efficiency. To this end, a sheet should be prepared along the lines of the accompanying form, especially adapted to cover the particular type of equipment used. The form given would apply to an exchange of almost any size of either the common battery or magneto type and can be modified to meet the requirements of smaller exchanges. The items mentioned in the form will be taken up in detail.

Main and Intermediate Frames.

Many opportunities for trouble to arise exist in the frames, if they are not periodically inspected. Such an inspection should

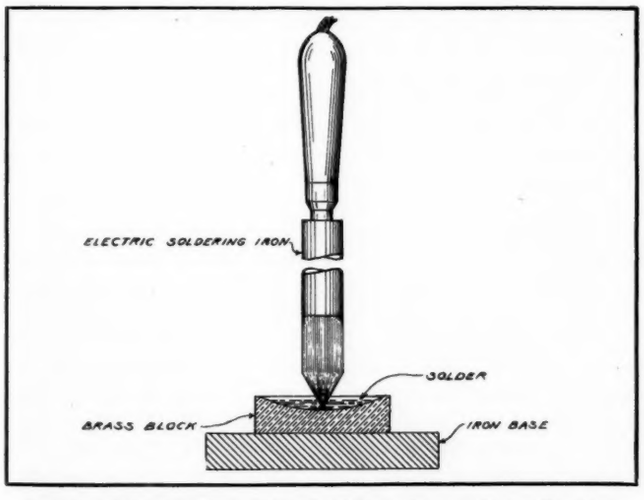


Fig. 42. Plan for Preventing Soldering Copper From Burning.

be made at least once a month. The arresters should be carefully inspected to see that the springs are not bent, twisted or broken. This is particularly necessary with arresters in which a test plug is used, for often the plug will be withdrawn by jerking the cord from a considerable distance, which may bend the springs, or by roughly forcing the plug into place. The exact method of inspection will depend considerably upon the type of arrester in use.

Terminals on the horizontal side of frames, which is usually the switchboard side in Bell exchanges, should be carefully inspected. Each jumper connection should be tested by shaking with long nose pliers to see that there are no resin connections or connections improperly soldered. Where the jumper wire joins the terminal, see that it is not skinned back too far so that the bare wire will not come in contact with adjacent terminals. See that all jumpers are connected with the red or trace wire to either the tip or ring terminals, in accordance with the practice prevailing in the exchange. In other words, all jumpers should be connected in a uniform manner. In the case of party lines, where there are two or more jumpers on the same pair of terminals, particular care should be taken to see that all connections are well made and that, if possible, all jumpers to the same pair of terminals, run through the same hole. The practice of bringing jumpers over the rail, because the holes are full, should be carefully avoided.

In arresters using heat coils, the coils should be examined to see that they are of the proper length so that when operated they will ground the line. On the other hand, if too long, the coil tips will cause grounds. All heat coils must be properly inserted so as to make firm contact and should be straight and well seated between the springs.

Carbons should be withdrawn, carefully dusted out and the mica separators so inserted that the open slot of the mica separator is downward. This leaves dust free to fall out. Only the standard thickness of mica should be used except in such special cases as are especially provided for by the engineering department. The use of paraffine, beeswax or other substances on the surface of the carbons, to keep them from "dusting" should be avoided, unless special instructions are issued by the engineering department for their use.

The coil connections should be properly run through at the rings in the frame provided for the purpose and should be as short as it is possible to make them. The practice of drawing the coil connection in as tight as a fiddle string should be avoided. It should be laid in the frame so that a certain amount of slack, depending on its length, will be left. Thus the wires will not be so tightly bunched together that it is impossible to pull out an old jumper.

Suitable boxes near the frame should be provided for carbons, micas and heat coils and a sufficient supply should be kept in the proper boxes. Boxes should also be provided for blown heat coils and damaged micas.

Dead cross connections should always be removed. They cause confusion and delay and necessitate considerable testing when running in new coil connections. The dead connections should be removed whenever a line is taken out of service, a cable pair changed, or other work done that makes the cross connection dead. A suitable reel should be provided on which all lengths of old wire taken from the frame may be wound so that it can be used over again.

One standard form of wire should be used for cross connections. This is usually of the flameproof, cotton braided variety, tinned, to faciliate soldering.

The soldering of connections should be done with resin core solder. Under no circumstances should acid be used. Electric soldering irons are preferred if kept in good condition. Where constantly in use the scheme shown in Fig. 42 will be found advantageous. This consists of a small brass block having a depression in which some melted solder may be kept. The tip of the iron when not in use is placed in this depression. The brass block radiates the heat from the tip and keeps it from burning. There are several devices on the market in which the iron may be placed which automatically reduce the flow of current when the tool is not in use.

Where the electric iron is not desired, a gas heated iron may be employed, a small gas heater with a suitable hood being provided on a slate shelf near the frame.

All cables should be numbered. The cable number appearing at the head. Each conductor should be numbered either on the fanning strip or on the side of the arrester spring itself. These numbers should be gone over occasionally and freshened up with paint so as to be readily visible.

Line numbers are usually punched on the terminal strip on

the switchboard side of the frame at every 10th or 20th jack. The jumper wires should be so separated that these numbers are visible. Screws and nuts holding the iron work, etc., together should be regularly inspected and kept tight. This particularly applies to the ground conductor terminals.

The lashing of all cables should be regularly inspected and if necessary renewed. The cables should be so lashed that it is impossible to bend the pothead wires, which are rubber insulated and which become brittle in time. In some exchanges it is a practice to coat these rubber wires with a protecting compound. In others they are left dry. If coated, the coating should be renewed when necessary.

The ironwork should be regularly painted to preserve it from rust and to present a neat appearance. A quick drying asphaltum varnish, presenting a gloss finish, is suitable for this purpose.

Where fuses are used, a reserve stock should always be available. The fuses themselves should be regularly inspected to see that they are tightly clamped in their terminals.

A suitable receptacle for blown fuses should be provided.

It is well to provide a record of the amperage of the fuses used in each cable head and to see that fuses of greater capacity are not used.

MAINTENANCE DEPARTMENT.

Report of Central Office Inspection Month of.....
.....191 Exchange .....

Inspection Items.	Condition of	Remarks.
MAIN AND INTERMEDIATE FRAMES.		
Arresters.		
Terminals on horizontal side.		
Heat coil tips (standard length).		
Mica separators (properly inserted).		
Cross connections through rails and fanning strips.		
Carbons, micas, heat coils, arranged in boxes.		
Dead cross connections removed.		
Idle lugs cleaned.		
Dummy equipment on only approved cables.		
Soldering on connections.		
Numbering of cable, conductors, panel and jack, etc.		
Screws and nuts in place.		
Lashing of cables.		
Painting of ironwork.		
Fuses.		
SWITCHBOARD, DESKS, WIRE CHIEF'S DESK		
Keyboards free of dust (inside).		
Jack striping.		
Number plates at answering jacks, stile strips, keyboard.		
Lamp caps at answering jacks and keyboard.		
Lamp cap guards.		
Screws on stile strips and keyboards in place.		
Cords supported by hooks.		
Forms and cable ends dressed and shellaced.		
Jacks fastened.		
RELAY AND REPEATING COIL BAYS.		
Screws in place on relay covers.		
Relay caps in place.		
Ironwork painted.		
Forms shellaced and dressed.		
Surfaces of apparatus dusted and cleaned.		
POWER BOARD AND MACHINERY.		
Brushes properly set.		
Slate oiled and cleaned.		
Nuts, bolts, screws tightened.		
Polished surfaces burnished.		
Ironwork painted.		
Forms and wiring dressed and shellaced.		
Commutators.		
BATTERY.		
(Regular inspection on form provided for the purpose weekly.)		
Tanks, inside woodwork painted.		
Iron conduits and floors painted.		
Number on tanks.		
Booster batteries tested for voltage.		
MISCELLANEOUS.		
Voltmeters.		
Ammeters.		
Specifications complete with drawings.		
Fuses under washers.		
Holes in framework filled.		
Fire apparatus.		
Chairs, couches, tables (casters, crutch tips, etc.).		
Gas stoves and soldering irons.		
Soldering irons (to be drawn out properly).		
Electric light apparatus and extension cords.		

Form for Keeping Track of Equipment Maintenance.

SWITCHBOARDS AND DESKS.

Keyboards should be inspected and the dirt and dust blown out with a bellows. It should be seen that each keyboard is locked. The dust between the springs of keys should be carefully removed, especially any metal particles due to the wear of the plungers. It often causes short circuits through the bushings between the springs.

In offices where the jacks are striped to denote various classes of service, the stripings should be regularly renewed and neatly done. For this purpose artist's tube colors may be employed. If they are mixed with a little dryer, they will dry quickly. It is presumed that some standard system of striping is in use. In cities where there is more than one exchange, it is very desirable that a uniform system be used throughout the several exchanges as it is necessary to shift operators from time to time.

Number plates at answering jacks should be regularly inspected and the missing ones replaced. The numbering on the plates should be renewed from time to time. Where these plates have a gun metal finish with sunken white letters, they may be renewed by filling the letters with white lead and wiping the surface of the plate.

Designation strips on keyboards should be renewed whenever they become dingy, and it should be seen that the celluloid covers are properly in place.

Lamp caps for both line and supervisory signals should be inspected and broken ones replaced. Where lamps are provided with guards, it should be seen that the guards are used.

All screws around the plug shelf and hinges of keyboards, etc., should be kept tight.

Cord terminals should be tightened and the cords supported from hooks. All battered or broken cord weights must be replaced.

Care of the cords themselves is looked after in the general maintenance. But, if in this general inspection, any cords needing renewal are noted, they should be immediately replaced.

All cable forms and ends should be dressed and if necessary shellaced. This applies to key cables as well as to the answering and multiple cabling.

All jack fasteners should be inspected to see that they are over the ends of the jack strips and are tight.

(To be continued.)

New Castle Company Has Large Increase of Subscribers.

The New Castle Telephone Co., of New castle, Pa., is adding new subscribers as fast as three gangs of installers can place the instruments.

From Factory and Salesroom

Convention: Mississippi Independent Telephone Association, Corinth, June 17, 18

Ericsson in Ontario.

"Beyond the Alps lies Italy," said a great warrior to his men a century ago. "Across the lake lies Canada," said Ericsson men to themselves considerably less than a century ago. Both were thinking of conquests to come—both wanted to add to the list of triumphs.

The weapons of war in the respective cases were quite different, however. Ericsson replaces the clang of steel, the rattle of musketry and "war's wild alarum" by the peaceful ring of a Steel telephone, the rattle of switchboard cords and the "alarum" of a loud ringing extension bell. "Handmike's Pretty Sister" follows the battle instead of the nurses of olden time—and, best of all, the results of the campaign are added peace, comfort and prosperity to the opposing forces.

In that great realm to the north of the United States, wonderful changes have taken place and the country has seen, in recent years, a most marvelous growth. It is a country of which the "Canucks" may well be proud—and they are. If you don't believe it, go over and listen to them.

In no city will you find more patriotic enthusiasm than in Toronto, the commercial center of the wealthy Province of Ontario. The city itself is growing in leaps and bounds—and it's a healthy wholesome growth devoid of "mushroom" aspects. Visitors from "the States" have often spoken of it patronizingly as "the most American Canadian city." But if you want to "get" a native Toronto "goat," as the saying goes, just spring that conceited comparison in Toronto.

They'll tell you that "the States" have no monopoly on the term "American" in the first place, and that Toronto doesn't need any such comparison to describe its greatness in the second place—we needn't flatter ourselves. And the worst of it is, they're right. Look at your atlas and you'll find that Canada is a considerable portion of America. It extends to the end of the earth. They are Americans over there, albeit of the division denominated "Canadian." And as for Toronto—well, there never was a liver, more businesslike and bustling city anywhere—and they're doing real business too, remember.

All of which long-winded diatribe is merely to lead up to the conclusion, which contains the real meat in the cocoanut. Ontario, as has been stated, is wealthy, prosperous and progressive. Ontario, therefore, has a considerable telephone development, both independent and municipal.

Toronto has Walter Warren. That's a small sentence, but a big statement. Mr. Warren has grown up with Toronto and Ontario and telephones. Therefore he's hustling and wide awake and prosperous and alive to every opportunity and to Ontario's every need. He felt it needed the best telephones it could get, as well as the best of everything else.

And be it remarked at this juncture, Walter Warren, though not the longest or widest of men, is the head of a company bearing about the longest and queerest name of any company ("Limited," of course) in Toronto—The Central Electric & School Supply Co. What things Electric have to do with "School Supplies" deponent sayeth not, but anyway Walter is IT in electrical and telephone supplies throughout the length and breadth of "Canada's Fair Domain," or that portion of it comprising Ontario, at least.

Probably there isn't a telephone man in Ontario who doesn't know the C. E. & S. S. Co. and they both know Ericsson. Hence the happy triangular arrangement which joins two great countries in the bonds of commercial matrimony and in the full enjoyment of the wonderful Ericsson "Quality" telephone apparatus.

And as the apparatus is said to be "Everlasting" and as Canada, being on a foundation of solid rock, was apparently designed by its maker to last forever, isn't it fitting to express the wish that the union of Ontario, Warren and Ericsson may "live happily ever after?" So be it.

New Gasoline Brazier and Tripod.

A gasoline brazier outfit designed for heavy brazing, pre-heating surfaces and similar work requiring intense heat for shop and factory is now being placed upon the market. This device is shown in the accompanying illustration. The burner is of improved construction, superheating the gas before it is burned and producing an intensely hot, blue concentrated flame about 2 ins. in diameter at the burner. The device is swiveled as illustrated and the tripod is adjusted so that the work can be brought to the flame in any desired position. The tank, which is of 10 gals. capacity, is heavily galvanized inside and out and made with welded seams. The required air pressure for operating the brazier is secured by means of a compound brass pump, supplied with the outfit. This brazier and

Gasoline Brazier for Heavy Brazing, With Tripod.

tripod are manufactured by the Clayton & Lambert Manufacturing Co., of Detroit, Mich., and are being put on the market to meet a growing demand for an outfit suitable for heavy brazing.

Good Showing by the General Insulate Company.

The introduction of an entirely new system, the breaking away from old routine, and the doubling of factory output, as a result, inside of five months, is what has been achieved by the General Insulate Co., 1008-14 Atlantic Ave., Brooklyn, N. Y.

This company had been enjoying in preceding years a healthy volume of business which seldom varied. The company had some big customers using its "Insulate" products and these apparently were well satisfied.

V. C. Steinberger, who was appointed general manager of the company the first of the year, investigated carefully his field, products, factory and employes and saw the possibility of enlarging the company's market. This he set

out to do, by rebuilding the foundation of his organization, by arousing the interest of his employes ,and by increasing their efficiency.

It is interesting to note how he proceeded and the success attending his plans and efforts. He did not have smooth sailing. The men were not keen or receptive to the suggestions made for increasing their production. It was a case of showing how much more money they could make under the new plan which offered them a certain rate per piece. Mr. Steinberger did not apply force in any instance; he carefully explained the advantage of the new system and gave illustrations showing where it had paid well in other establishments. Inside of several weeks the entire force was converted to the change and their enthusiasm naturally increased as they witnessed substantial increases in their pay envelopes. One man who strenuously objected to the new plan before its adoption, claiming he had attained his maximum output, increased his production over 50 per cent. after the new system was inaugurated.

The capabilities of each man were carefully studied. Mr. Steinberger says his experience has taught him that the efficiency of individuals varies in a way quite different from that which seems at first apparent. What one can do well, possibly another man can do still better; so it meant a readjustment of conditions and a selection of the work to suit the individuals, One man previously had long had a reputation for the number of pieces he was capable of machining per day. By chance another man was tried on the same work and inside of a few days had exceeded the best day his predecessor had ever had by 66 per cent. Other surprises awaited the employes. As they have succeeded in increasing their production to the standard set they have received in addition a bonus which has acted as a further stimulus. Each operation is correlated; and everything moves along in clock-like order until the completion of the product.

Savings have been made wherever possible. One method of packing by sawdust instead of by wrapping, saved $400 a year in time and labor alone. The company has also gone into special work and has consequently added a number of new customers to its books. The month of April was the largest in the history of the company, being 100 per cent. greater than the average month's business for 1912. Arrangements are now being made to increase the capacity of the plant 50 per cent.

The Worth of Matthews Fuse Switches.

W. N. Matthews & Brother have received a letter from a telephone company against which suit for $10,000 has been brought for the death of an employe who was accidentally electrocuted by coming in contact with a charged cross arm brace, which became so charged by reason of a cross in the line. While the company was insured against loss, W. N. Matthews & Brother point out that Matthews fuse switches on the line prevent accidents of this nature and one case of this kind prevented means a saving in expense more than enough to repay the cost of completely equipping an entire system.

Resignation of R. W. Hutchinson.

It is understood that R. W. Hutchinson, Jr., advertising and publicity manager of the International Motor Co., with offices at Broadway & 57th St., New York city, has resigned, the resignation to take effect June 1.

Mr. Hutchinson has had charge of the advertising and publicity for the International Motor Co. since the time of its organization and previous to that time was connected in a similar capacity with the Saurer Motor Co. Mr. Hutchinson is an engineer of broad experience and during his connection with the International Motor Co. has become known as one of the best advertising experts in the motor truck industry.

Mr. Hutchinson during the last three years has been one of the most prolific writers on motor topics in the country, his articles appearing not only in trade journals, but in the leading magazines through the world. Mr. Hutchinson's education and training as a mechanical engineer has placed him in a unique position among experts on motor truck transportation. His future plans are indefinite at this time.

Weston Miniature Direct Current Instruments.

The Weston Electrical Instrument Co., of Newark, N. J., has recently developed and placed upon the market a complete line of miniature direct current instruments of the Weston permanent-magnet movable-coil type, for the measurement of current and voltage. They are made in both portable and switchboard forms. The line comprises voltmeters, special battery-testing voltmeters, ammeters, volt-ammeters, milli-voltmeters, and milli-ampere meters, in various combinations of single, double and triple ranges.

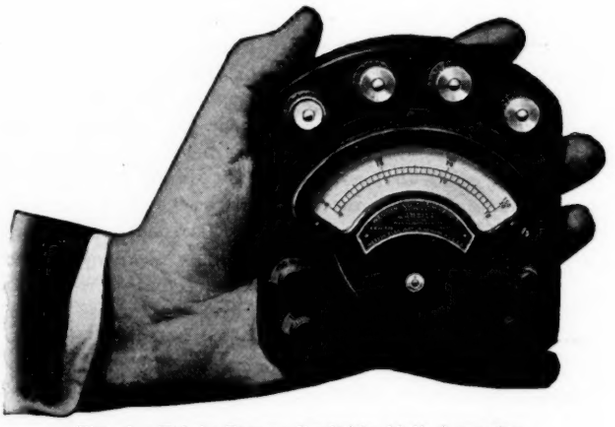


Fig. 1.—Triple-Range Portable Volt-Ammeter.

The instruments are neatly finished in dull black, with nickel-plated trimmings.

The same care is exercised in the manufacture of these instruments as is characteristic of the other well known types of Weston instruments. The instruments are small and very compact, the portable form having outside dimensions of 4.4 in. by 4.6 in. They weigh less than one pound each, and may easily be carried in the pocket. They have a knife-edged pointer, which enables close readings to be made. The scale has a length of 2.75 inches.

The working life of an instrument depends on the proper

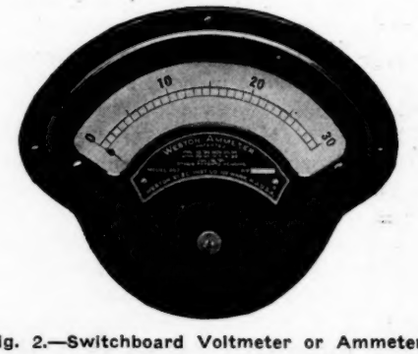


Fig. 2.—Switchboard Voltmeter or Ammeter.

design of the movable system, which must be very light and at the same time rigid, and the spring torque must be high in comparison with the weight and moment of inertia. The movable system in the Weston miniature in-

struments weighs less than 0.2 gram (less than the weight of two ordinary pins), and its parts are so well distributed that the time required for the pointer to come to rest after the application of, or change in, the current or voltage is about one-fifth second, which for all practical purposes is instantaneous. The movement of the pointer is damped, or made "dead-beat," by means of the aluminum frame on which the wire forming the movable coil is wound, in a manner similar to that in the larger type of Weston instruments.

These instruments have been subjected to the most severe conditions in use. They are being successfully employed on the dashboards of thousands of automobiles, where the

Fig. 3.—Volt-Ammeter.

vibration and jar are far in excess of that which would be encountered in ordinary testing.

Both portable and switchboard forms are shielded against external magnetic fields, and are practically unaffected by changes in temperature.

Of the accompanying illustration Fig. 1 shows a triple-range portable volt-ammeter (Model 280), which is just one-half actual size. By means of this instrument any current from 30 amperes to 0.05 ampere and any voltage from 150 volts to 0.02 volt can be measured. The uses to which this type of instruments may be put are manifold. They are well suited to high school and college use, where, on account of their low price, there may be secured a sufficient

Fig. 4.—Battery Testing Voltmeter.

number to provide each student working in the laboratory with an instrument.

Amateur electricians in wireless and other lines of work will find that the use of an instrument by which accurate quantitative results may be obtained will open up new and larger fields for experiment, and explain many failures and difficulties which would otherwise be inexplicable. Railway signal engineers and all those who must carry instruments from place to place, either for general testing or inspection work, will appreciate the compact form and light weight of these instruments. Furthermore, the combination volt-ammeter with multiple range reduces the number of instruments required to be carried. These instruments are especially useful in telegraph and telephone testing and, in general, for all work where small direct currents and comparatively low potentials are used.

In Fig. 2 is shown the model 267 switchboard form of meter, one-half actual size. These instruments have the same general characteristics as the portable form just described. They are provided with a pear-shaped pointer-tip to enable readings to be made at a distance. They are all single-range, but are made in ranges increasing by small steps from 50 milli-amperes to 30 amperes in the case of ammeters, and from 50 milli-volts to 150 volts in voltmeters. This form of instrument is useful for all purposes where size and weight are important factors, and also where the cost of installation must be kept low, such as indicating instruments on automobiles, battery-charging sets, isolated house-lighting plants, apparatus for physicians' use in electro-therapeutics, dental work, etc.

The illustration, Fig. 3, shows a Model 268 switchboard volt-ammeter which is designed especially for use on storage-battery charging outfits or for automobiles, and other small storage-battery installations where it is desired or is necessary to use a single instrument to indicate both volts and amperes. It indicates the charging or discharging current, and by pressing the contact button, indicates the voltage of the cell or battery.

In Fig. 4 is shown (one-half actual size) the special battery-testing voltmeter. These are provided with a steel point as one of the terminals to facilitate making contact to one of the plates or terminals of the cell to be tested; the other terminal consists of a flexible lead also provided with a point. They have knife-edge pointers, and are made with the zero in the center, so that the voltage may be read regardless of the polarity.

Paragraphs.

R. S. MUELLER, manufacturers' agent and warehouseman, 423-425 High avenue, S. E., Cleveland, Ohio, has issued his Cleveland stock sheet showing magnet wire in stock on May 19. Mr. Mueller handles electric wires, cords and cables for Alfred F. Moore, Philadelphia, Pa., moulded hard rubber substitutes, for the General Insulate Company, Brooklyn, N. Y.; electrical tapes, webbings and sleevings for the Anchor Webbing Co., Woonsocket, R. I., and sheets, rods, tubing and special shapes for the Delaware Hard Fibre Co., Wilmington, Del.

THE DUPLEX METALS CO., Chester, Pa., has sent out a circular and cartoon, entitled, "The Pike Grows Big on Small Fry," and pointing out that the little savings count. Lots of people, the circular states, think that the tie wire question is hardly worth bothering with, and yet by using copper clad ties instead of copper the user gets three times as much for his money. It is stated further that they are just as rust-proof as copper; are lighter and more easily handled; stronger and more permanent.

Facts About Father Time.

The Calculagraph Company, 9-11-13 Maiden Lane, New York City, manufacturers of the calculagraph for indicating the time of toll messages, has issued a booklet on horology or the "science of time measurement" and "the art of constructing machines for the measurement of time." This is an historical sketch and valuable treatise on horology from the earliest ages to the present time and records the achievements of the world famed workers in this field. The work is written by Henry Abbott and is a reprint from The Keystone Magazine.

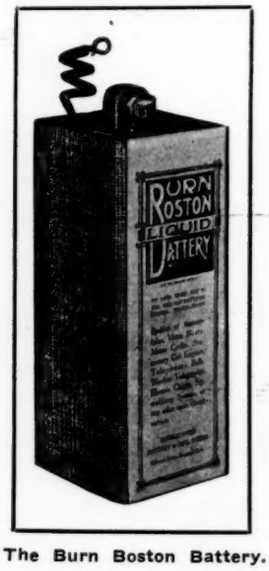
The Burn Boston Battery.

The Burn Boston Battery is a primary cell designed for all purposes for which a dry cell can be used. Its makers, however, with singularly specific claims call it "a step beyond dry cells." They state that by means of their liquid electrolyte, local action is arrested while the circuit is open and, as proof, they point to independently conducted storage tests showing a loss of .04 volt and 1.67 amperes. Apparently authentic records of service tend to the same conclusion.

It is further stated that, by means of the internal construction, the circulation of electrolyte is so thoroughly accomplished that the elements are used without waste, producing a current content greatly in excess of that of any dry cell. This claim is specifically based upon tests conducted by the Electrical Testing Laboratories, of New York City, as well as upon the experience of the manufacturers of one of the leading electric automobile horns, and of a considerable number of users.

The War and Navy Departments are understood to be using the cells in quantity; the New York Fire Department has adopted them for its entire fire alarm telegraph system and the New Jersey Department of Labor is specifying them for all factory fire alarm equipment.

The battery is about the size of the ordinary dry cell, square, in a zinc container insulated from the electrolyte, and is encased in a waterproof carton. It is manufactured



The Burn Boston Battery.

by the Burn Boston Battery, Boston. Literature and any other information desired will be sent upon request.

F. W. Pardee in the Pitcher's Box.

Some of us know F. W. Pardee's capabilities as a singer and comedian. In the "Mikado" rendered by a Chicago choir with considerable success several years ago, he starred in the role of Lord High Executioner. But possibly not many know he is "some" base ball player, too.

One of our staff representatives called last week at the Ericsson factory in Buffalo, and during the noon hour watched Frank steam them over the home plate. It was a good thing that the catcher's glove was well padded, for Frank has some speed as well as curves. A few of the major league managers who at this time are puzzled over the poor work of their pitching staff might do well to dispatch a scout to Buffalo.

A fire drill was an interesting feature which was practiced. Several hundred employes handled their particular assignments expeditiously and it is safe to say that fire would have considerable difficulty in making much headway if it occurred when the employes were present during working hours.

New Kerosene Quart Torch.

The growing demand for the use of kerosene as fuel for torches and firepots has led the Ashton Mfg. Co., Newark, N. J., makers of the well known "Red Hot" line of torches and firepots, to place on the market four new kerosene quart torches,

New Kerosene Torch.

one of which is shown in the accompanying illustration. The makers claim that these torches will do any and all work that can be done with gasoline torches, of which type they are also manufacturers.

Kerosene gas produces an intense heat, and since the cost of kerosene is only about one-half the cost of gasoline, the saving in fuel will soon pay the cost of the tool. The tanks of these torches are made of seamless drawn brass, highly polished and fitted with improved automatic brass pump. The filler plug is made with air valve for releasing the air pressure. The burners are made of special generator metal with chamber which superheats the gas. Cleanout plugs are provided which enable the user to clean the device should it become clogged from impurities in the kerosene.

Telephone Men in the A. I. E. E.

The May Proceedings of the American Institute of Electrical Engineers report that the following, recommended by the board of examiners, have been transferred to the grade of fellow, by the board of directors. F. L. Gilman, superintendent, Western Electric Co., Hawthorne, Ill., and A. E. Kennelly, professor of electrical engineering, Harvard University, Cambridge, Mass.

At the same meeting of the directors, the following associates were transferred to the grade of member in accordance with the special section of the constitution: O. B. Blackwell, engineering department, American Telephone & Telegraph Co., New York; P. G. Burton, engineer, Chesapeake & Potomac Telephone Co., Baltimore, Md.; Elam Miller, transmission and protection engineer, American Telephone & Telegraph Co., New York, and B. H. Shepard, division sub-licensee manager, New York Telephone Co., Syracuse, N. Y.

Steamer Equipped with Telephone Exchange.

One of the interesting features of the steamer Berkshire of the Hudson Navigation Co. in New York, which had its trial trip this week and also made its first trip between New York and Albany, is a telephone system which connects every stateroom, pilot house, dining saloon, purser's office, steward's room, ladies' tea room, parcel room, and other points with one another through a central switchboard. The boat is equipped also with connections for the use of the telephone system with the main exchanges at New York and Albany when the vessel is docked. The Berkshire is said to be the only steamer on the Hudson with a telephone system that can be thus connected.

Legal Cases and Decisions

By A. H. McMillan

Induction on Parallel Lines.

"I enclose copy of the Bermuda Electric Light, Power & Traction Company's act, 1904, and ask if you will be good enough to give your opinion on paragraph 53 of that act.

We were in the field as an operating company for a number of years, prior to the advent of the electric light company. A short time ago, it extended its lines to St. George, a distance of 12 miles, where we have a small exchange. The trunk and subscribers' lines to this exchange are grounded, also some of the long rural lines in that direction. The electric light company operates 2,300 volts and runs continuously except on Sunday. It parallels our lines a great deal and, as a consequence, our transmission is very much affected by induction. Can we, according to the act, or, if this protection was not afforded us by this act, compel the electric company to make good to us the expense we will be put to to build metallic lines? What is done in the United States or Canada under similar conditions?"

The paragraph cited is as follows:

"53. It shall not be lawful for the company to lay down, erect, construct or operate in any part of these islands any line or lines for the purpose of conveying electrical current for lighting or power in such manner as to prejudicially affect the working of the military electric telegraph or telephone lines, the cables or telegraph lines of any submarine cable company carrying on business in these islands under the sanction of any act of the legislature, or the lines of the Bermuda Telephone Co., Limited, or in any other company which shall be hereafter authorized by the legislature to establish any electric, telegraph or telephone lines in these islands; and it shall be the duty of the company to comply with such regulations as shall from time to time be made by the governor in council for preventing the lines of the company from being laid down, erected, constructed or operated in such manner as to prejudicially affect the working of such other lines as aforesaid; and it shall be lawful for such regulations to impose for any breach thereof any penalty not exceeding 50 pounds a day for any single offense and not exceeding ten pounds a day for any continuing offense, and such penalties shall be recoverable in the manner prescribed by The Crown Causes Act, 1893, or as near thereto as circumstances admit, and if the military electric telegraph or telephone lines, the cables or telegraph lines of any submarine cable company carrying on business in these islands, or the lines of the Bermuda Telephone Co., Limited, or any other company which may be hereafter authorized by the legislature to establish any electric, telegraph or telephone lines in these islands, shall be prejudicially affected by the construction or working of the line or lines of the company constructed and operated for the purpose of conveying electric current for lighting or power, or for supplying electrical current for operating a railway or tramway or be otherwise prejudicially affected by electrolysis or other cause arising or resulting from the operations of the company, the company shall pay the expenses of all such alterations in or additions to such cable line, or wire sheathings, coverings or supports, as may be necessary to remedy such prejudicial affection. For the purposes of this section, a cable line or wire shall be deemed to be prejudicially affected if telegraphic or telephonic communication by means of such cable line or wire is, whether through induction or otherwise, in any manner affected by any act or work of the company."

We believe the act in question is intended to protect you in such a case as you state. Even without the existence of this statute, we think you could rightfully call upon the electric company to make good to you, the expense of doing whatever is necessary to avoid the induction. This might be the building of metallic lines, the moving of your line a greater distance away from their line, or vice versa. Sometimes the making of transpositions upon the electric light wires will relieve the situation.

The principle involved is that the electric company must so use its property as not to interfere with, or damage the system of another electric company. The company first rightfully in possession is entitled to protection against interference by induction from the one subsequently erected. For any damages so caused, the later established company is liable, and the company injured is also entitled to an injunction to restrain the electric company from maintaining its wires in proximity to those of a telephone company. McMillan on Telephone Law, Section 139. Nebraska Telephone Co. vs. York Gas & Electric Light Co., 27, Nebraska, 284; 3 American Electrical Cases, 364.

A telephone company can obviate the serious effects of induction by increasing the distance between its wires and those of the electric company, as the effect of induction at a distance of 15 feet is but slight, the rule being that induction between parallel lines is inversely proportional to the square of the distance between them. Where a telephone company can avoid induction by this means, it is its duty so to do. Rocky Mountain Bell Telephone Co. vs. Salt Lake City Railway Co., 3 American Electrical Cases, 356.

Permission from a Stranger to the Title.

"Four years ago our company set a telephone pole on property occupied by *A*. *A* not only granted us permission to set the pole, but assisted in locating and setting it, and said the property belonged to him. Since that time *A* has died and we have received a notice from *B*, claiming the property belongs to him; that *A* was an irresponsible person; and notifying us to remove the pole. Can *B* compel us to remove the pole? What would be the proper course to pursue?"

If *B* was the owner of the property and *A* did not have title to it, the permission from *A* amounted to nothing, and *B* can compel you to remove the pole. The proper course to pursue is to insist on *B* showing you that *A* had no right to the property.

Rural Lines in Georgia.

"I am thinking of building a telephone line. Will you please give me information about the laws regarding the erection of rural telephone lines in the state of Georgia?"

For information concerning the laws regulating the erection of rural telephone lines in the state of Georgia, we must refer you to your local authorities. It will be proper for you to incorporate under your state laws, and it will be necessary for you to obtain permission to erect your lines from such local authorities as have charge of such matters in your state.

Brakeman Injured by Overhanging Wire.

In a brakeman's action for injuries from being struck by overhanging telephone wires, where the complaint charged the excessive speed of the train as negligence, and also alleged that because of such speed he could not see the wires and avoid being struck, the speed of the train was held admissible in evidence as bearing on the question of the contributory negligence of the injured man. The sagging condition of the wires was found to be due to the act of a party other than the parties to the suit. After the act that caused the wire to sag, a period of an hour and a half or two hours elapsed. This time was held not to be long enough to charge the company with notice of the defective condition of the wire. Southern Kansas Ry. Co. vs. Shinn, 153 Southwestern, 636.

Partnership Accounting.

In 1896 or 1897, Rawlings and Fish began to build a telephone line between Berea and Lancaster, Ky., as partners. They also organized the Berea, Kingston & Richmond Telephone Co. as a corporation, Rawlings owning two shares and Fish a larger number. A judgment in the partnership accounting between the two provided that if Fish surrendered two shares of stock, the judgment should be for $500 but if he did not do so, it should be for $450. This judgment was affirmed on appeal, the court holding that the judgment was in effect for $450 the stock being valued at $50. Rawlings vs. Fish, 152 Southwestern 941.

Condensed News Reports

Officers of Companies are Earnestly Requested to Forward Us Promptly All Financial and Other Statements as Soon as Issued, and Any Items of Interest as to Their Plants and Systems

New Companies.

WICKES, ARK.—Articles of incorporation have been filed by the Arkansas & Oklahoma Telephone Co., with a capital stock of $15,000. The officers are as follows: Robert C. Smith, president; and Charles L. Smith, treasurer.

TWIN FALLS, IDAHO.—Articles of incorporation have been filed by the Castleford Telephone Co., with $2,500 capital stock. The incorporators are: Elbert R. Hobbs, Frank D. Hartwell, David B. Thomas, E. W. Kenyon, F. H. Danon and Clara O. Brown.

FLANAGAN, ILL.—The Northern Lights Telephone Co. has been incorporated with $600 capital stock. The incorporators are Wm. Emm, Conrad Gran and Louis Rapp.

GRIDLEY, ILL.—Articles of incorporation have been filed by the Fairview Drive Telephone Co. with $750 capital stock. The incorporators are: J. W. Kirkton, J. O. Albrecht and D. J. Augsburger.

UNITY, ILL.—The Unity & Olive Branch Telephone Co. has been organized with $510 capital stock. The incorporators are F. M. Riggle, Geo. Hodges and E. J. Gause.

MOORES HILL, IND.—The Moores Hill North Hagan Telephone Co. has been incorporated with a capital stock of $300. The directors are Eugene Giblin, Matthew Heller, Harry Bigney, Lucien Walton and George Rumsey.

CRESTON, IOWA.—Articles of incorporation have been filed by the Thayer, Audubon & Southwestern Telephone Co. with a capital stock of $228.

NEWTON, IOWA.—The Farmers' Mutual Telephone Co. has been incorporated with a capital stock of $10,000. B. M. Squires is president; George Shelly, vice-president, and Victor Reynolds, secretary.

MT. VICTORY, KY.—The Mt. Victory Mutual Telephone Co. has been organized with $1,200 capital stock. The incorporators are: James Jones, J. M. Ratliff, Melvin White and Jacob Jenkins.

OWENSBORO, KY.—The Daviess County Telephone Co. has been incorporated with a capital stock of $50,000.

DENTON, MD.—The Farmers' & Merchants' Telephone & Electric Co. has been formed with a capital stock of $175,000, to take over the properties of the Farmers' and Merchants' Telephone Company, of Hillsboro, and the Peninsular Light & Fuel Co. of Denton. Harry M. Thompson, of Hillsboro, is president and general manager of the new corporation and G. S. Rairigh, vice-president. The board of directors is composed of Messrs. Thompson and Rairigh, Clement Drake, D. K. Crouse, Robert E. Smith, Albert G. Towers, Harvey L. Cooper, J. Kemp Stevens, James H. Nichols, T. Pliny Fisher, Thomas A. Smith, Albert G. Saulsbury, Thomas W. Jones and Dr. Fred N. Nichols.

LAKE CITY, MICH.—The farmers of this vicinity recently organized a telephone system to be known as the Lake City & Enterprise Telephone Co. The following officers were elected: President, Ed. Powell; secretary, Charles Davis; treasurer, O. L. Pickering.

MILLINGTON, MICH.—At a recent meeting the Arbela Mutual Telephone Co. reorganized under the name of the Tuscola Farmers' Telephone Co., with a capital stock of $15,000. The following officers and directors were elected: President, C. W. McNeal; vice president, Marcus Jenson; secretary, J. D. Austin; treasurer, Ira J. Hossler; additional directors, W. L. Brooks, Roy Hains, Archie Gilles.

LEE'S SUMMIT, MO.—The Lee's Summit Telephone Co. has been incorporated with $20,000 capital stock. The incorporators are J. R. Blackwell, E. S. Bennett and others.

EAST SYRACUSE, N. Y.—A new telephone company, to be known as the Co-operative Telephone Co., is being organized in this city. Over 350 subscribers have alreday been secured.

SOUTH WESTERLO, N. Y.—The South Westerlo Telephone Co. has been incorporated with $1,000 capital stock. The incorporators are: Frank Shephard, of Greenville; D. H. Rundell and E. R. Palmer, of South Westerlo.

BALFOUR, N. D.—The Karlsruhe Telephone Co. has been incorporated with a capital stock of $6,000. The board of directors is as follows: John J. Wald, John F. Wald, Christ Merck and Wendelin Black.

GARDENA, N. D.—The Farmers Telephone Co. has been incorporated with a capital stock of $9,750. Directors have been elected as follows: Adolph Klebe; Peter Hett, John Boettcher, Jacob Riberdorf and J. F. Nehring.

LA MOURE, N. D.—The Pearl Lake-Gladstone Telephone Co. has been incorporated with a capital stock of $10,000. The directors are as follows: C. H. Kelly, Carl A. Evers, C. J. Sanders, Elling Satreaas, all of LaMoure and Emil E. Ellinson, of Litchville.

AMORITA, OKLA.—The Amorita Mutual Telephone Co. has been organized with $5,000 capital stock. The incorporators are: J. L. Presvall, president; W. H. Johnson, secretary, and L. P. Millspough, treasurer.

MCCONNELLSBURG, PA.—The Ayr Telephone Co. has been incorporated with $5,000 capital stock. The incorporators are: J. C. Patterson, Webster Mills; John Weister, Philadelphia; W. R. Sloan, and J. P. Sipes, both of McConnellsville.

ULYSSES, PA.—Articles of incorporation have been filed by the Bingham & Ulysses Telephone Co. with $5,000 capital stock. The incorporators are P. H. Miller, G. W. Loucks, G. M. Tarbox and H. G. Collins, all of Ulysses.

FOUNTAIN INN, S. C.—The Fountain Inn Telephone Co. has been chartered with a capital stock of $4,500. The officers are: Jas. M. Richardson, president and treasurer; Jas. H. Stewart, vice president, and W. B. Stewart, secretary.

GARRETSON, S. D.—Articles of incorporation have been filed by the Garretson Co-Operative Telephone Co., with $10,000 capital stock. The incorporators are: Frank Locke, of Sherman; Lars Stensland, A. H. Stephenson, Alfred Engelson and B. T. Hokenstad, all of Garretson.

DICKSON, TENN.—The Home Telephone & Telegraph Co. has been chartered with $2,000 capital stock. The incorporators are: Mrs. G. W. Brown, B. B. Brown, J. A. Bitz, Hollis Harris, R. A. Wright, J. F. Wallace and A. L. Corbin.

NASHVILLE, TENN.—The Southern Telephone & Telegraph Co. has been chartered with $10,000 capital stock. The company will construct lines from that city to various parts of the state. The incorporators are: K. J. Bernard, J. E. Fisher, A. F. Whitman, J. H. Stafford and H. M. Whitting.

CRYSTAL FALLS, WASH.—Articles of incorporation have been filed by the Little Pend Oreille Telephone Co. with $5,000 capital stock. The incorporators are: O. E. Battman, Thomas Domica, E. E. Wright, Edward Fisher, Albert Toothacker, of Crystal Falls; P. D. Starr and J. S. Gragy, of Colville.

SEATTLE, WASH.—The Long Distance Telephone Equipment Co. has been incorporated with $300,000 capital stock. The incorporators are Oscar O. Mercer, J. L. Criswell and F. D. Shoemaker.

CORNELL, WIS.—The Cornell Telephone Co. has been organized with $3,000 capital stock. The incorporators are G. F. Steele, Chas. McArthur and F. J. Skolsky, all of Cornell.

ELLSWORTH, WIS.—Articles of incorporation have been filed by the Rush River Farmers' Telephone Co. with $2,500 capital stock. The incorporators are Christ Howe, H. E. Carpenter and Lloyd Tombleson, all of Ellsworth.

MADISON, WIS.—Farmers of Albion and Dunkirk are organizing an Independent co-operative telephone system which will cover eight miles, connecting directly with Stoughton and Edgerton. The committee in charge is composed of N. Teigen, E. Vinger and H. Ryerson, all of Stoughton.

Construction.

VICTORIA, B. C.—The government is planning to construct a telephone line from Campbell River to Alert Bay, a distance of about 120 miles.

BLOOMINGTON, ILL.—The Central Union Telephone is planning to erect a new two-story exchange building in that city, to cost approximately $8,000.

HILLSBORO, ILL.—The People's Mutual Telephone Co. will construct an additional line between that city and Litchfield.

HUNTLEY, ILL.—The McHenry County Independent Telephone Co. has leased quarters and will install a new exchange in this city.

CHERRYVALE, KANS.—The Cherryvale Telephone Co. will string 7,000 feet of cable this spring.